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BRIEFLY TOLD.

THE "PROFESSION OF GAS ENGINEERING" IN THE UNITED STATES.—"The profession of gas engineering has never been much more than a name in the United States, and, though very creditable engineering work has been done, it was chiefly done by apparatus builders and the superintendents of the gas companies. It is very questionable whether the progress of the business would be benefited by a nearer approach to English or German methods, as it appears to the writer that the attempt in the above named places to cover all the ground by the genius of one man has resulted, in England particularly, in unnecessarily increasing the cost of engineering structures by the exploitation of individual hobbies and by tying them up with impracticable specifications, the main object of which appears to be the discomgture of the contractors—I do not wish it to be understood that Europe has a monopoly of this industry, as we are raising a respectable crop of peculiar American specifications ourselves. These observations apply more particularly to other structures than those of gas works, and many of the successful American contractors for European engineering works have overcome this difficulty by flatly refusing to follow any specifications, preferring to guarantee their work to comply with any stipulated requirements regarding strength and efficiency, reserving to themselves the methods by which they should secure results that could not be impeached. This action on the part of the American contractors has drawn the attention of the English manufacturers to the fact of their being handicapped by the specification, and much has been done and written by them in an effort to modify these conditions. Though specifications are necessary in all engineering works, there is a vast difference between the enforcement of reasonable requirements and of the farcical presentments of those specifying an assortment of impracticable chemical and physical requirements. What may be called the engineering of manufacturing, or the combination of theory and practice and miscellaneous suggestions from 'Tom, Dick and Harry,' which has produced so many successful American machines and improvements, seems better suited to this country than that engineering ability which occupies sumptuous offices and makes perfunctory inspections of work, clothed in 'plug hats,' tan-colored gloves and patent leather shoes. Between these two classes a wide field is now opening in the gas engineering of America, and which is at present largely filled by the engineering corps of the manufacturers. I believe I am correct in saying that the manufacturers would be glad to give up this work, which is a great expense to them, but they fear they may be called upon to face the English type of specification, if prepared by others. Without detracting from the ability of the superintendents and managers of the various companies, I think it may also be said that the manufacturers are to-day better able to design gasholders, tanks, retort benches, meters, generators and other apparatus than the gas companies themselves, and this statement is made because it is the rare exception that work is given out to any contractor on a specification prepared entirely by the gas company. Hitherto this plan has worked very well for the gas companies, as it has not only relieved them of all engineering expense, but also of the responsibility for the design which they would have to assume if it were their own. With the large present and prospective growth of the business, the question comes up as to who is to do this designing in the future, and particularly in regard to the question of responsibility. The designing of modern gasholders and other apparatus now carries with it a responsibility which is practically equivalent to the liability on a bond, and the structures are becoming so large and so costly that a failure in a single instance would mean bankruptcy to any but the strongest firms. The experience of the older engineers is good up to a certain point, but it can only reach to the point it has once attained, and though a knowledge of the country up to the frontier is desirable, it does not help much in traversing the new country we are now entering. Many of the older engineers and designers have not had the necessary technical training to enable them to deal successfully with new and untried conditions, but on the other hand it must be remembered that the latest graduate of any of our technical schools or colleges is not a gas engineer. He has made a good beginning, but it is only a beginning, and the fund of practical knowledge and information in the hands of the older engineers is worth more to him than all his technical knowledge (though he is usually apt to think otherwise), and with the best teachers this information cannot be acquired by him in any 3 or 4 years' 'course.' With only this fund of practical knowledge we can keep on doing what we have already done, and by slow and tentative

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methods make some progress, but it is scarcely too much to say that the solely technical engineer can do nothing alone. The knowledge of the technical engineers and the wisdom of the practical class are both required to work together to make the best progress, and neither can claim to be the more important factor. Among the older engineers are now many men who have had a technical education, but it has become so covered up with practical experience that the x's, y's and other subtler symbols do not stick out so prominently as in the more recently manufactured article. The younger engineers, therefore, have not an entire monopoly of all technical knowledge, but the idea that they have this monopoly probably accounts for a certain bumptiousness about the majority of them, and though we can well afford to recognize their ability as far as it goes, their quiet assumption of all the practical knowledge in which they are eminently deficient, is rather galling to older engineers and contractors with whom they come in contact. This unpleasant characteristic frequently leads them to assume the role of teachers after the first few lessons as learners of the elements of practical work, and though at the period of their incubation as engineers they would not have known a heap of concrete from a heap of mud, they suddenly become experts in the minutest details of cement manufacture and testing, and of how to mix, gauge, wet and lay concrete, all of which are embodied in two or three pages of a long winded specification. We have devoted considerable space to picking out the flaws in the character of the young engineer, because we wish him to improve it, and to become an engineer in fact, and not have to refer to the 'union tag' given him by his alma mater in proof of his ability. Another engineer, who may be classed as 'not listed,' is to be found on all engineering works. His generic name is 'Jack,' and his vocation may be that of iron worker, retort setter, foreman or general handy man, but his avocation is that of assistant engineer. He is usually an uneducated man, of strong natural engineering instincts, diligent in business, resourceful and self-reliant. A good 'Jack' will save a young (or old) engineer from a world of foolishness, but the engineer must guard against the imitation 'Jack," who is only a sycophant, and will fool him to the top of his bent. 'Jack' will occasionally hang on to his opinion in the face of all opposition, and his obstinacy may make it necessary to send him back to retort setting, while the engineer plumes his ruffled feathers; but he is good medicine. His name is usually conspicuous by its absence in the 'Transactions' of the various Associations. The successful designing of a gas works requires two talents, seldom found in combination in one man. These are the knowledge of how to build a gas works, and how to run one. Many apparently well designed works have been built with little knowledge of the latter qualification, and they are invariably inconvenient and expensive to run. To this cause is chiefly due the difference in cost of gas in the holder in works which are under the same conditions as regards cost of labor, coal and price of residuals. This difference may in extreme cases amount to nearly as much as the entire interest charge on the cost of the works, or, say, 5 cents per 1,000 feet. We think it probable that the future designing of gas works will be by a combination of the ability of both the manufacturers and of the superintendents and managers of the gas companies, and by a division of the responsibility between them. This will be practically inviting competitive designs, if there is to be any competition, and the gas companies should pay for all designs they may ask for. The business of the office gas engineer would thus become chiefly advisory and inquisitorial, and would be largely in the direction of investigating new fields for gas works, examinations of existing gas companies, and of new inventions. Regarding this latter subject it is not much to the credit of the United States that, with all the inventive talent here, so few useful inventions in the manufacture of gas can be credited to this country. We have an ancient claim on the present meter valve which was invented by Bogardus, but was patented and introduced in England by Sullivan. Water gas was invented in England and France, under natural conditions that made its economic development impossible, and the great expansion of this business here would have been impossible except for the discovery of oil in great quantities close to the most populous cities. High pressure gas distribution was a natural development of the high pressure distribution of natural gas, and it can scarcely be called an invention. Gas was conveyed in England, at Beckton, under a higher pressure than the distributing pressure long before it was done here, and the few small plants now using this system for direct supply to consumers can hardly be considered a satisfactory demonstration. The development of the iron or steel gasholder tank is largely due to American engineers, but it cannot be said to have originated here. Cast iron banded tanks were commonly used in Europe many years ago, and the original Beckton tanks were partly of wrought iron plates. A large wrought iron tank (242 feet diameter by 42 feet deep) was built in Leeds, England, about 12 years ago. Though this is not a very good piece of engineering and is partly buried in the ground, it stands to-day as the largest iron gasholder tank in the world. We believe this completes the list of what may be called fundamental American gas inventions, but we cannot establish a very clear title to any of them. To come to a close, let there be unity of work between the old schools and the new respecting the development of the gas engineer in the United States, but do not let us follow the example of the electrical engineers either here or abroad, lest their teachings might put us as far in the mire as they have put themselves in the mud.—P."

[Abstract.—Continued from page 885.]

PROCEEDINGS, THIRTY-SECOND ANNUAL MEETING, AMERICAN GAS LIGHT ASSOCIATION.

Held in the New Willard Hotel, Washington, D. C., October 19 to 21, 1904.

Second Day—Second Session.

The session was called to order pursuant to adjournment. The

Report of Committee on Next Place of Meeting,

recommending Milwaukee, Wis., as the place, was adopted. The

Discussion on the Spangenberg Paper

was then resumed.

Mr. F. N. Morton, Philadelphia, Pa., said if it were possible for two persons to express diametrically opposite views and yet both be right he thought the meter users and the meter makers had done so in the discussion before them. He thought there could be no question but that the manufacturers were doing their best to give good quality, and to make a meter which would give the best service over a very extended period of time. To do this it was necessary to limit the speed of the moving parts to prevent undue wear. The logical result was that the meter had no overload capacity, and gas companies were compelled to set very large ones to take care of a maximum possible consumption, which might occur during a few hours of the year, or perhaps not at all. If the meter were built to run nominally at the rated speed, but with a large overload capacity which would be called upon for a very short period, it was hard to believe that its life would be materially shortened.

Mr. H. K. Morrison, Concord, N. H., said the writer of the paper began with the statement that "But little progress has been made toward establishing a standard," and closed it with the further statement that "any standard, even one which would secure no improvement over the present average efficiency of the machine, w ould undoubtedly save many thousands of dollars." It was the point of standardization which he wished to emphasize. Referring to Table B, the writer called attention to the difference in dimensions of the seven different makes of meters, also the dimensions which affect the change of meters. Dimension A, in the 3-light meter, varies $\frac{3}{4}$ of an inch; in the 5-light meter $1\frac{1}{4}$ of an inch, etc. Dimension B, which is the center-to-center distance, across the top, between the screws, varied from $\frac{7}{8}$ of an inch in oue size to 1 inch in another. These dimensions varied too much, even for lead connections, and for iron connections the cost of changing would be very great.

Mr. Wm. J. Serrill, Philadelphia, appreciated the objections which the meter makers had brought out against the meter with small diaphragm and large valves, but he thought the experiment well worth a trial. The saving in average investment would be so great, and also in increased capacity, that the objections were not serious enough to prevent a fair trial being given to a meter as proposed by Mr. Spangenberg. This was not a radically new meter, only the old meter with changes in the proportions of its working parts. Mr. McIlhenny had asked if it were wise to take a meter, made to run at 9 revolutions per minute, and operate it at 29 revolutions in a like period of time. He hardly thought it would be; but if the meter were made to run at 29 revolutions per minute the chances were that it would be as satisfactory at that speed as the old style at 9 revolutions per minute. A speed of 29 revolutions per minute did not frighten him at all. In view of Mr. McIlhenny's offer, he was prepared to state that the United Gas Improvement Company would order 1,500 or 2,000 meters of such pattern and give them a trial, and at the next meeting of the Association would report on their work through the Research Committee. While he doubted if 8 or 10 months' trial would entirely prove the case, he considered that 2 years hence a pretty fair idea could be formed as to the success or failure of the new meters. While a great deal had been said about the long life of the present meters (and that was an important matter), he thought if greatly increased capacity and greater service could be obtained from them, something of the length of life might profitably be sacrificed, particularly so if economy in price could also be secured.

Mr. R. B. Brown, Milwaukee, was surprised to find in all the discussion on Mr. Spangenberg's paper the apparent assumption that the meter was to run continuously at the new and greater rate of speed, which was an error. The maximum demand upon 95 per cent. of the meters was for so short a time that it could not seriously affect the life in any event. Comparison between the meter and the steam engine

had been made, but he thought a better comparison would be with electric machinery, which had often to care for a similar load with short peaks. Electrical apparatus was rated at the load which it would safely carry continuously, but was built so that when peaks up to 50 per cent. over the normal rating were encountered they could be carried safely for short periods. The proper application of the rule to the rating of gas meters would seem to fill the bill. The idea of trying to stop the occasional overloading of a meter in the belief that it will shorten its life, he thought, would seriously block progress in this direction.

Mr. B. H. Spangenberg, Philadelphia, in closing the discussion said: Concerning the measurement of loss of pressure at different parts of the machine, such measurements were taken, but as they had no direct bearing on the point at issue—namely, the total net capacity—they were not included in the paper, nor were the figures at hand. Regarding the opportunities afforded him by his employers for carrying out this work, he wished to say, there and then, that he appreciated to the full measure those opportunities; for, without the consent and the outlay made by the United Gas Improvement Company, the information gathered and presented in the paper would probably not have been secured for several years to come. One important point brought out in the discussion was that changing conditions of the gas business call for changed and improved methods of operating. The main issue was the formulation and adoption of a standard. What individual items should go to make up a complete standard could not well be threshed out at a formal meeting of the Association. Much preliminary work must be done, and many experiments suggested by this preliminary discussion must be made. As to high speeds affecting the accuracy of registration, the tests of large meters, quoted by Mr. W. J. Serrill, tended to show that the accuracy of such meters was within as close limits as meters now in use. Trial alone could give convincing proof. He wished it borne in mind, that while proposing to get out of the measuring machine all possible capacity service, he did not propose to push it beyond its safe and proper working. He approved heartily of Mr. John D. McIlhenny's suggestion that 1,000 or 2,000 such meters be made and put into service. This would prove or disprove the point at issue concerning accuracy. As to durability of meters, he had seen thousands condemned, but not one was condemned for wearing out; they rusted out but did not wear out. Personally he would prefer a machine that would wear out than one which would rust out, or even than one which would half wear out and half rust out.

The President expressed the thanks of the Association to Mr. Spangenberg for his very excellent paper.

Mr. Paul Thompson, Philadelphia, then presented the following resolution:

Whereas, This convention has ratified and approved the action of the Council in appointing representatives on the committee, in response to the suggestions of the Gas Congress held at St. Louis, June, 1904, to further the cause of consolidation of the various Gas Associations. It is

Resolved, That a sum, not to exceed $200, be and is hereby appropriated toward a fund to defray the expenses of this committee. [Adopted.]

The President introduced Mr. F. W. Frueauff, of Denver, Col., who read his paper, entitled

METHODS OF CHARGING FOR GAS.

[For the text of the Frueauff paper, see JOURNAL, Nov. 7, 1904, p. 723.]

Discussion.

Mr. I. Butterworth, Grand Rapids, Mich., opened the discussion by saying that, while the method of charging for gas proposed by Mr. Frueauff might not be the best that could possibly be devised, it seemed to him the best that had been proposed to the present time, and that possibly the ideal method might not be materially different. The proposed method was founded on the just principle that each consumer should pay in proportion to the cost of serving him. While to some it might appear visionary and impractical, it was not so, as he had demonstrated, by 3 years' experience with the Denver Gas and Electric Company, during its contest with a rival electric company. He ascribed the victory won by the Denver Company largely to this system of charging, which weeded out the unprofitable customer and cultivated the profitable one only; and while it was more readily adapted to the electric business, it might be successfully applied to the gas business. If it were so effective in time of war, it should be advantageous in time of peace. Several gas men who studied the method during the last few years were not only convinced of its theoretically correct principles, but that it was perfectly practical for the gas business, and that the adoption of some such system was becoming absolutely imperative. The manager of a large company told him that under the present system of charging it lost money on every customer whose bills amounted to a charge for less than 2,000 cubic feet per month, the profitable consumers making up for this loss. The system under discussion, he thought, would undoubtedly increase a gas company's earnings by reversing these conditions, as it had done for the electric companies. As Mr. Frueauff had pointed out, the only present difficulty in applying the system to the gas business was that of determining a consumer's maximum instantaneous demand, but in the meantime the capacity of the meter required might be used as a basis of calculation. The only objection he could see to the method was the trivial one that a particular customer might use his maximum at a time when it would not increase the peak of the load, and, therefore, he should not be charged to cover the cost of the larger main; however, he should be charged to cover the cost of service pipe and meter—large enough to take care of his maximum instantaneous demand upon them. He felt that the question of gas rates was so vital that it could not be settled until it should be settled right. He agreed with all Mr. Frueauff had said, even his statement that the present method of charging not only reduced possible net earnings, but was inequitable to the point of actual dishonesty.

Mr. J. H. Enright, Frederick, Md., asked if the readiness-to serve charge could be more justly applied by the electric company than by the gas company.

Mr. E. Haase, Milwaukee, said—One of the most interesting tables in the paper was that demonstrating the effect which a readiness-to-serve charge had on electric sales, and that should offset a considerable amount of theorizing on the opposite side of the question. If the data had been further analyzed to show separately the effect upon the consumers existing at the time the rate was put into effect, from the effect of developing new fields of business, it would probably have afforded a better parallel of what might be expected in gas. The analysis of gas consumers' accounts showed that 34 per cent. of the consumers did not pay the cost of the service given them, and 50 per cent. of them did not pay cost and interest on investment, since they used but 20 per cent. of the output. It might be considered desirable to cut off these unprofitable consumers, but that was not possible. Moreover, it was quite likely that many of them were desirable. For instance, in one flat of a house was a consumer using 50,000 feet per annum, in another flat, supplied by the same service, and requiring only an additional meter, was a consumer using but 20,000 feet. Together the two used 70,000 feet, which was more profitable than one alone using 50,000 feet. Close analysis of costs, as applied to the 20,000 foot consumer, would show that he was desirable, although he might swell the list of "unprofitables." Mr. Frueauff said further there was under consideration a system of charging for gas on the following basis: $12 per year per consumer, plus $15 per 100 feet of maximum demand, plus 60 cents per 1,000 feet for gas used. If the average demand charges therein proposed are not the actual cost of these items, the charges would be arbitrary and inequitable, since large consumers would be unduly benefited by the low rate for gas sold, while small consumers would derive little benefit from the low rate because the fixed charges constituted so large a part of what he paid. Assume that $6 was a proper consumer charge, and $10 per 100 feet maximum demand was the proper demand charge, then compare two consumers: No. 1, using 50,000 feet per annum with 80 feet maximum demand, and 60 cent gas rate:

Consumer charge	$6
Demand charge	8
50,000 feet gas at 60 cents	30
Total	$44

Or at the rate of 88 cents per 1,000. No. 2, using 2,000,000 feet per annum, with 1,250 feet maximum demand and 60 cent gas:

Consumer charge	$6
Demand charge	125
2 million feet gas at 60 cents	1,200
Total	$1,331

Or a rate of 66 cents per 1,000 feet. With same demand and consumers' charges, but with gas at 70 cents per 1,000, the result would be:

No. 1.—Total charge $49, rate = 98 cents.
No. 2.— " " $1,531, " = 76 "

Raise consumer and demand charges to $12 and $15 respectively, and with gas at 60 cents, the result would be:

No. 1.—Total charge $54.00, rate = $1.08.
No. 2.— " " $1,899.50, " = .69.

If it were unprofitable to sell to No. 1 at the lower consumer and de-

mand charges with gas at 60 cents, the price of the gas would have to be raised and not the fixed charges. This would raise the price to No. 2 in the same proportion per 1,000, and if the resulting cost should be more than would hold his business a discount on quantity used would, after all, have to be granted. It was a safe proposition that 85 per cent. of the clamor for lower price of gas comes from the 85 per cent. of customers who would not be benefited by the proposed system. How, then, could this 85 per cent. of the grantors of gas franchises be reasoned with? Sliding scale prices were arbitrary, but so are the determinations of consumer and demand charges. The question is, which is the most expedient? In general, it was safe to assume that charges would be governed to a large extent by what the traffic will bear, and discriminations would be made according to the quantity and purposes for which gas was used, even if ready-to-serve charging were adopted.

Mr. E. G. Cowdery, St. Louis, Mo., thought there was much to comment upon in Mr. Frueauff's paper, but the speaker thought one point should not be lost sight of. In promoting growth in the business many small consumers, such as would be classed by Mr. Frueauff as unprofitable ones, must be taken in the hope and belief that they would grow and develop into profitable customers. They could not be obtained at all unless started off on a basis which would not stop them at the outset, and, although at first using only 10,000 to 12,000 feet per annum, they would in a few years, through education in the use of gas, become profitable.

Mr. G. W. Clabaugh, Omaha, Neb., said he had listened to the reading of the paper with much interest, and thought something should be done to change unprofitable customers into profitable ones. The greatest complainers he had met with with were those having small offices downtown with bills not exceeding $2 per year. They would "kick" over a bill for 100 feet of gas, use up an hour's time of the man at the complaint desk, and demand a change of meter every other month The paper presented a commercial problem which should open the eyes of the sales' engineers. The business of gas companies had changed materially in the last 20 years, largely owing to competition of electricity, and some means should be devised by which unprofitable consumers could be eliminated without creating too much criticism from local authorities.

Mr. A. E. Forstall, New York, remarked: "Everything comes to him who knows how to wait." Six years ago he read a paper before the Association in which he advocated a change in the method of charging for gas. In this he simply followed the footsteps of Mr. Walton Clark, who read a paper on the same subject, in 1891. Mr. Clark's paper received practically no consideration, while his own, though pronounced all right, received no discussion. Now, a paper on the same subject was deemed worthy of considerable discussion, and in four or five years one might be presented the thoughts of which might be adopted. In passing, he wished to say to Mr. Clabaugh that both Mr. Clark and himself were considered gas engineers, and that the men who "sat down" on their papers belonged to the commercial departments of various companies. He called attention to the writer's statement that the proposed method of charging had not been adopted by any gas company, except by one small Eastern one, with a modification of the system, in which a ready-to-serve charge was made, but none for maximum demand. He thought he knew the Eastern company referred to, and that he was responsible for the adoption of the system of charging, which was not the Doherty system, but one advocated in his own paper. He had been obliged to wait several years before he had a company under his individual control where he could install the system and determine how impracticable it was. The class of consumers in the town, which was a very poor one, numbered only about 180. It seemed to him impossible to make any money with anything like a decent price for gas, unless some system of this kind could be devised which would cut off unprofitable consumers. A meter rent of 12½ cents per month was already in force, so the consumers were prepared for some fixed charge. He did not like the term "meter rent," since in too many instances it had been declared illegal. Hence he announced that the price of gas would be in two parts, one a fixed charge of 25 cents per month per consumer, irrespective of the amount of gas used, the other a certain rate per 1,000 feet of gas consumed, which rate was less than what had been charged. As a result of the fixed charge, 6 consumers were lost, but since the largest consumption of any one of these was 200 feet in a year, he figured that a great gain had been made in losing them. The $3 per annum received from those who did not use gas during the year, but retained their meters, so they could use them in case of need, he thought paid all expenses of keeping the accounts on the books, together with interest on the services and meters.

Mr. A. S. Miller, Baltimore, wished to protest against the statement in the paper reading, "How the first meter rates for gas were arrived at no one seems to know. As years have gone by, these rates have been cut, either voluntarily or by ordinance, without any apparent regard to the actual connection between cost and profit." He believed that the original directors of the business knew what gas cost them, and that the price for it was fixed intelligently, not blindly, as the paragraph would seem to indicate.

Mr. T. D. Miller, New Orleans, thought that if a specific charge should be made for being ready to serve, in case of failure from any cause to give the service when demanded, the company would be subject to damages for such failure, having collected for several months a fee for which service was not rendered when demanded.

Mr. Frueauff, in closing the discussion, said there were few points brought out in the discussion which had not been covered by Mr. Doherty in his remarks. The expenses occasioned by maximum demand were not as pronounced in the gas as in the electric business, but they existed and should be taken into consideration in making "rational rates." The rates instanced by Mr. Forstall overlooked the demand feature, hence could not be classed as readiness to-serve charges. Sizes of mains varied according to the demand, even in very small towns, and the difference in investment must be taken into account in fixing the rates. Those named in his paper were not claimed to be perfect for all time, they were offered simply as a starter. Eventually the rates would approximate more closely to the actual relation between the cost and the selling price. Nor was it claimed that the suggested rates should apply to all consumers, for in some localities it would not be possible at the outset. Where companies were making new rates, or changing rates, a careful analysis would show that a horizontal reduction could not profitably be made, but that reduction must be made where it would do the most good and not increase losses on already unprofitable customers. He thought Mr. Miller had not read far enough before criticizing the extract which he quoted. The next two sentences would reveal that it was simply the average price which directors considered in making reductions, and he still maintained that these reductions were made regardless of, and even without knowledge of the unprofitable consumers, who were already causing losses.

The President thanked Mr. Frueauff, in the name of the Association, for his valuable paper.

(To be Continued.)

(Concluded from Page 890.)

Consumers' Meters.

[A paper prepared for and read at the Thirty-second Annual Meeting of the American Gas Light Association, by MR. B. H. SPANGENBERG, Philadelphia, Pa.]

TABLE "A."

Showing the Test of Thirty 30-Light Meters of Maker No. 3.

Meter Tested. No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	*213.60	249.60	*302.40
2	192.00	231.00	288.60
3	198.00	252.00	292.20
4	181.80	223.80	276.00
5	178.20	238.20	274.20
6	†172.20	237.60	285.60
7	211.80	248.40	300 00
8	199.20	251.40	292 80
9	173.40	232.80	282.00
10	212.40	249.00	296.40
11	183.60	239.40	278.40
12	172.80	227.40	276.00
13	184.20	240.00	279.60
14	205.20	*253.80	292.80
15	184.20	223.80	276.60
16	186.00	240.00	292.80
17	210.60	248.40	294.00
18	185.40	222.60	291.60
19	213.00	250.20	299.40
20	187.20	222.60	276.00
21	211.80	249.00	300.00
22	183.00	237.00	274.20
23	175.80	234.00	280.20
24	180.00	237.00	282.00
25	191.40	231.00	288.00
26	188.40	221.40	276.00
27	176.40	220.20	268.80
28	175.80	219.60	266.40
29	175.80	†219.00	†261.00
30	184.20	238.80	279.60
Totals	5,687.40	7,089.00	8,523.60
Average cap. per hour per meter.	189.58	236.30	284.12
*Maximum " " any " .	213.60	253.80	302.40
†Minimum " " " " .	172.20	219.00	261.00

Average temperature, 78° F.

TABLE "A."

Showing the Test of Thirty 30-Light Meters of Maker No. 4.

Meter Tested, No.	Capacity Per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	192.60	*237.60	270.00
2	196.80	236.40	270.60
3	192.00	228.00	270.00
4	190.80	234.00	271.20
5	189.00	236.40	271.80
6	*199.80	234.60	268.80
7	192.60	236.40	267.60
8	193.20	234.00	270.00
9	188.40	232.20	270.00
10	190.80	234.60	268.20
11	196.80	236.40	272.40
12	192.00	234.60	270.60
13	188.40	230.40	262.80
14	189.00	237.00	272 40
15	188.40	†226.20	264.00
16	198.60	235.20	266 40
17	187.80	229.80	262.80
18	195.00	237.00	273.60
19	189.00	236.40	272.40
20	192.00	234.60	270.00
21	194.40	234.00	*276.00
22	196.20	232.20	268.80
23	194.40	234.60	270.00
24	192.60	232.80	267.60
25	194.40	234.60	270.00
26	†186.60	227 40	264.60
27	187.80	229.80	†261.60
28	188.40	227.40	264.00
29	194.40	234.60	270.00
30	198.60	234.00	268.20
Totals	5,770.80	7,003.20	8,066.40
Average cap. per hour per meter.	192.36	233.44	268.88
*Maximum " " any .	199.80	237.60	276.00
†Minimum " " " .	186.60	226.20	261.60

Average temperature, 81° F.

TABLE "A."

Showing the Test of Thirty 30-Light Meters of Maker No. 6.

Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	*256.80	303.60	352.80
2	†208.80	283.20	313.20
3	226.80	†252.00	316.80
4	218.40	283.80	350.40
5	237.60	288.00	339.00
6	232.80	261.60	†309.60
7	228.00	258 00	345.60
8	241.80	288.60	336.00
9	226 80	276.00	334.80
10	234.00	300.00	340.80
11	230.40	278.40	*360.00
12	228.00	355.20	345.60
13	216.60	*379.80	348.00
14	219.00	366.00	348.60
15	229.20	276.60	360.00
16	228.60	277.20	360.00
17	236.40	202.60	348.60
18	229.80	308.40	340.80
19	240.00	305.40	357.60
20	237.00	286.80	336.00
21	226.80	276.00	333.60
22	227.40	286.20	335.40
23	238.20	277.80	348.00
24	227.40	256.20	343.20
25	230.40	278.40	348 00
26	237.60	301.20	340.80
27	238.20	289.20	336.00
28	236.40	287.40	338.40
29	225.60	274.20	333.00
30	241.20	291.60	357.00
Totals	6,936,00	8,728.80	10,257.60
Average cap. per hour per meter.	231.20	290.96	341.92
*Maximum " " any " .	256.80	379.80	360.00
†Minimum " " " " .	208.80	252.00	309.60

Average temperature, 83° F.

TABLE "A."

Showing the Test of Thirty 30-Light Meters of Maker No. 5.

Meter Tested, No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	247.20	276.00	310.80
2	*253.80	*289.80	*330.00
3	244.20	266.40	326.40
4	237.60	276.60	318.00
5	249.60	276.00	319.20
6	†230,40	280.20	316.80
7	233.40	274.80	312.00
8	243.60	268.20	324.00
9	248.40	275.40	310.80
10	232.80	262.80	324.00
11	245.40	272.40	307.20
12	247.80	277 20	312.00
13	246.60	275.40	310.80
14	249.00	276.00	319.20
15	247.20	274.80	310.80
16	234.00	270.60	†304.80
17	240.00	268 20	321.60
18	242.40	†262.20	322.80
19	245.40	271.20	325.80
20	243.00	268.80	324.00
21	238.20	277.20	320.40
22	232.20	282.00	319 20
23	244.20	278.40	326.40
24	249 00	282.60	320.40
25	230.40	278.40	318.00
26	245 40	280.80	324.00
27	238.20	279.00	322.80
28	246.00	280 80	324.00
29	249.60	270.60	321.60
30	240.00	278.40	322.80
Total	7,275.00	8,251.20	9,570.60
Average cap. per hour per meter.	242.50	275.04	319.02
*Maximum " " any " .	253.80	289.80	330.00
†Minimum " " " " .	230.40	262.20	304.80

Average temperature, 84° F.

TABLE "A."

Showing the Test of Thirty 30-Light Meters of Maker No. 7.

Meter. Tested. No.	Capacity per Hour Under Loss of Pressure of 3-10 In.	4-10 In.	5-10 In.
1	†168.00	216.00	252.00
2	180.00	*228.00	270.00
3	178.80	223.20	261.60
4	176.40	223.20	256.80
5	180.00	211.20	*276.00
6	183.00	223.80	264.00
7	176.40	217.20	256.80
8	183.00	225.00	264.60
9	180.00	225.00	261.60
10	183.60	225.00	264.00
11	178.20	222.60	259.80
12	181.20	210.00	274.20
13	177.00	216.60	256.80
14	181.80	218.40	261.60
15	170.40	217.20	254.40
16	181.20	225.00	264.00
17	178.80	217.80	261.60
18	182.40	219.00	262.20
19	169.20	216.60	252.00
20	183.00	216.00	258.00
21	*187.20	227.40	268.80
22	181.80	224.40	264.00
23	177.00	214.20	256.80
24	182.40	210.60	246.60
25	176.40	214.80	256.80
26	181.80	224.40	264.00
27	182.40	225.00	264.00
28	171.60	218.40	254 40
29	180.00	†209.40	†244.80
30	179.40	222.00	259.20
Totals	5,372.40	6,587.40	7,811.40
Average cap. per hour per meter.	179.08	219.58	260.38
*Maximum " " any " .	187.20	228.00	276.00
†Minimum " " " " .	168.00	209.40	244.80

Average temperature, 78° F.

TABLE "B."—*Measurements of Dry Meters in Inches*—(Sketch below).

Size of Meter.	Dimensions.	Manufacturer. I.	II	III.	IV.	V	VI.	VII.	Experimental.
3 Light.	A	13⅞	14¼	14¼	14 7/16	14⅝	14¼	14⅜	14⅜
	B	10 11/16	11 3/16	11 3/16	40⅞	10 11/16	10¾	11 1/16	11
	C	6⅝	6¾	7	6⅝	6¾	6 11/16	6¾	7⅛
	D	7¾	8 1/16	8¼	8¼	8 1/16	8 1/16	8 1/16	8¼
5 Light.	A	15 9/16	15⅜	15 11/16	15¾	16¼	15⅞	15⅝	16⅛
	B	12 3/16	12¼	12¼	12⅛	12 7/16	12⅛	11⅞	12¼
	C	7⅛	7¼	7 1/16	7 7/16	7⅛	7⅛	7¼	7⅞
	D	8⅜	8⅜	9⅜	9¼	8⅞	8⅜	8 3/16	9⅜
10 Light.	A	17⅛	17 1/16	17 1/16	17¼	18	18	17⅝	17⅓
	B	14¼	14 5/16	14 7/16	14 7/16	14⅜	14⅓	14⅛	14⅓
	C	8¼	8¼	8¼	8⅜	8 3/16	8⅜	8¼	8⅞
	D	10 1/16	10 3/16	10⅜	11⅛	10⅜	10⅛	10⅛	11
20 Light.	A	20⅜	20 1/16	21⅛	21⅛	21 1/16	21⅞	21⅛	20⅓
	B	17⅜	17⅛	17 5/16	17 9/16	18	17⅞	17⅜	17⅓
	C	10¼	10⅛	10¼	10⅝	10 7/16	10⅜	10 7/16	11¼
	D	12 5/16	11⅛	11⅞	12⅜	12⅛	12 5/16	12⅛	12⅛
30 Light.	A	23½	23½	24⅛	25⅛	24⅝	25	24⅛	25
	B	19⅛	19¼	20¼	20⅛	20⅛	20¼	19⅛	20⅓
	C	11⅝	11½	11⅛	12⅛	12 7/16	12¼	11⅓	13⅜
	D	14⅛	13½	13½	15⅛	15⅛	15⅛	13⅞	15⅜

The numbers here assigned to the manufacturers differ from the assigament on p. 80.

Measurements of Dry Meters—(Table above).

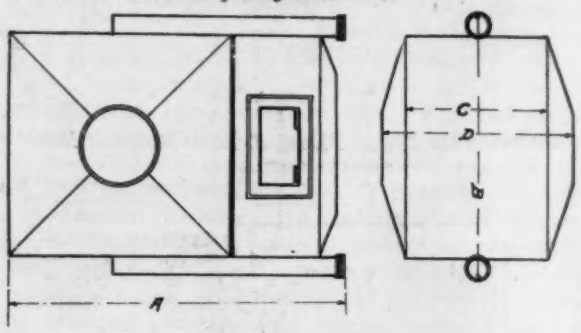


TABLE "E."

Showing relative capacities in cubic feet per hour of thirty 5-light new meters, ten each of three different makes—fitted first with regular size diaphragms, and second with special size diaphragms. Test made 8-26-03 to 8-28-03.

Maker No. 3.

Meter Tested, Number.	3-10 Inch Loss in Pressure—Regular Diaphragms.	Special Diaphragms.	5-10 Inch Loss in Pressure—Regular Diaphragms.	Special. Diaphragms.
1	50.40	52.80	82.80	81.00
2	49.80	52.80	80.40	84.00
3	40.20	47.40	75.60	81.00
4	45.00	56.40	79.20	84.00
5	49.80	59.40	75.00	82.80
6	39.00	46.20	70.20	75.00
7	49.20	52.20	75.00	82.20
8	49.80	56 40	78.60	85.20
9	34.20	47.40	68.40	75.60
10	39.00	46.80	74.40	79 20
Averages	44.64	51.78	75 96	81.00

Maker No. 4.

1	44.40	60.60	74.40	85.20
2	55.20	66.00	80.40	92.40
3	44.40	61.20	75.60	87.60
4	49.20	60.60	79.20	85.20
5	54.66	66.00	82.80	97.20
6	54.60	66.00	87.00	93.00
7	49.80	66.60	83.40	93.00
8	49.20	61.20	76.80	88.80
9	51.60	57.60	84.00	88.20
10	54.60	61.20	80.40	88.80
Averages	50.76	62.70	80.40	89.94

Maker No. 5.

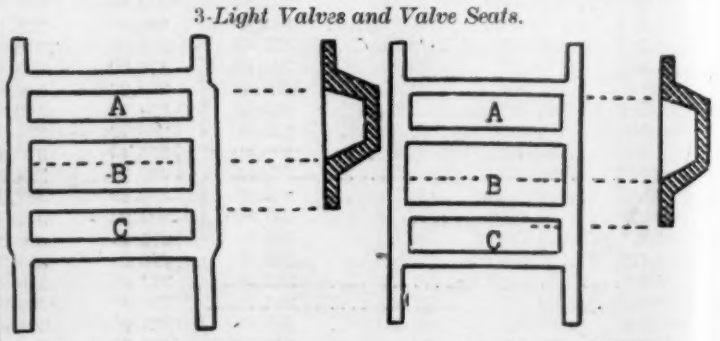
1	68.40	72.00	99.60	103.20
2	73.20	76.80	104.40	106.80
3	75.60	77.40	100.80	106.80
4	72.00	72.00	97.20	104.40
5	73.20	76.80	102.00	106.80
6	68.40	72.00	98.40	104.40
7	69.00	72.00	100.80	100.20
8	73 20	76.80	100.80	108.00
9	69.00	76.80	100.80	105.00
10	68.40	76.80	97.80	108.00
Averages	71.04	74.94	100.26	105.36

TABLE "F."

Showing capacities per hour of 30 experimental meters, 6 of each size, from 3-light to 30-light inclusive, each meter being tested with differential inlet and outlet pressures of 3-10 inch, 4-10 inch and 5-10 inch.

Size Meter.	No.	Capacity in Cubic Feet Per Hour While Passing Gas. Loss in Pressure. 3-10 Inch.	4-10 Inch.	5-10 Inch.	
3-Light	1	99.60	132.60	152.20	
	2	74.20	117.20	146.40	
	3	79.20	115.80	146.60	
	4	81.00	115.20	146.40	
	5	98.40	122.40	147.60	
	6	67.80	114.00	147.00	
Averages		83.37	119.53	147.70	Average temp., 84°
5-Light	1	141.60	174.00	216.00	
	2	147.00	186.00	220.80	
	3	141.60	177.60	216.00	
	4	132.00	169.20	213.00	
	5	145.20	184.80	225.00	
	6	138.00	189.60	220 80	
Averages		140 90	180.20	218.60	Average temp., 81°
10-Light	1	242.40	321.60	372.00	
	2	304 80	355.20	399.60	
	3	244.80	318.00	400.80	
	4	277.20	328.80	372.00	
	5	193.80	288.00	355.20	
	6	211.20	297.60	369.60	
Averages		245.70	318.20	378.20	Average temp., 80°
20-Light	1	414.00	528.00	616.80	
	2	418.80	528.00	609.60	
	3	348.00	537.60	600 00	
	4	336.00	492.00	585.60	
	5	436.80	542.40	604.80	
	6	364.80	523.20	604.80	
Averages		386.40	525.20	603.60	Average temp., 79°
30-Light	1	580.00	758.00	876.00	
	2	525.00	720.00	859.20	
	3	523.20	739.20	888.00	
	4	606.00	792.00	890.40	
	5	576.00	810.00	900.00	
	6	600.00	768.00	864.00	
Averages		568.37	764.53	879.60	Average temp., 78°

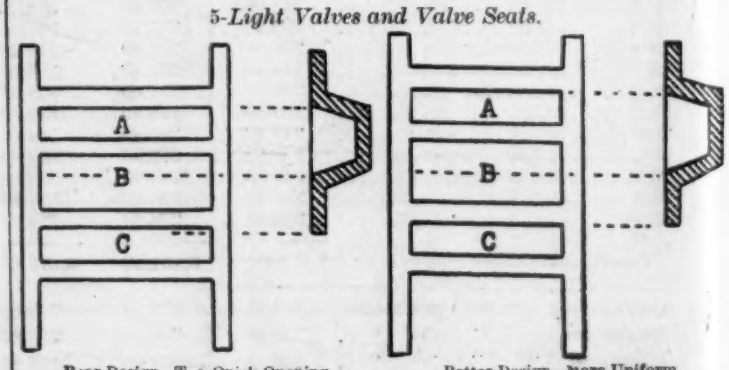
3-Light Valves and Valve Seats.



Poor Design—Too Quick Opening. Port Opening "B" Restricted.

Better Design—More Uniform Flow. Port Opening "C" Restricted.

5-Light Valves and Valve Seats.

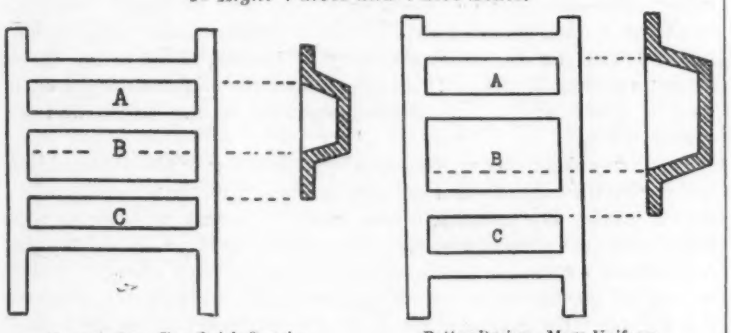


Poor Design—Too Quick Opening. Port Openings "B" and "C" Restricted.

Better Design—More Uniform Flow. Ports Open Full.

0.94 Actual Size.

10-Light Valves and Valve Seats.

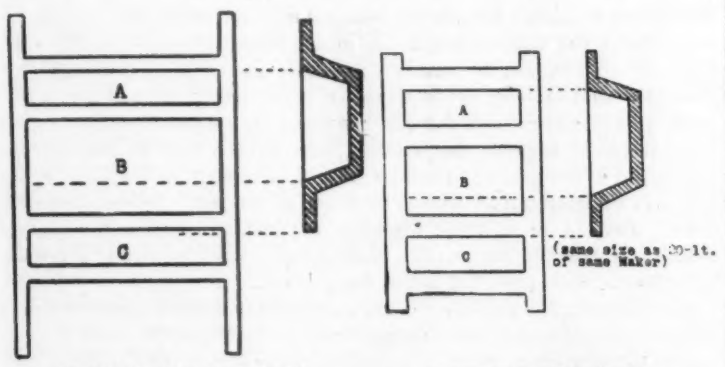


Poor Design—Too Quick Opening. Port Opening "B" Restricted.

Better Design—More Uniform Flow. Ports Open Full.

0.86 Actual Size.

20-Light Valves and Valve Seats.

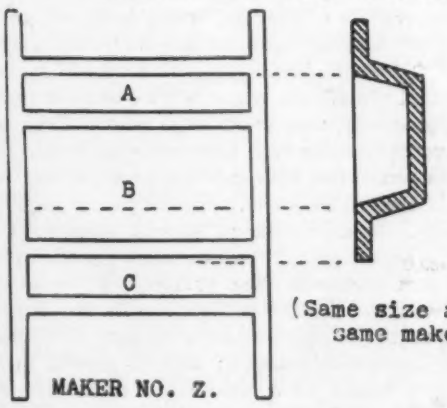


Poor Design—Too Quick Opening. Port Opening "C" Restricted.

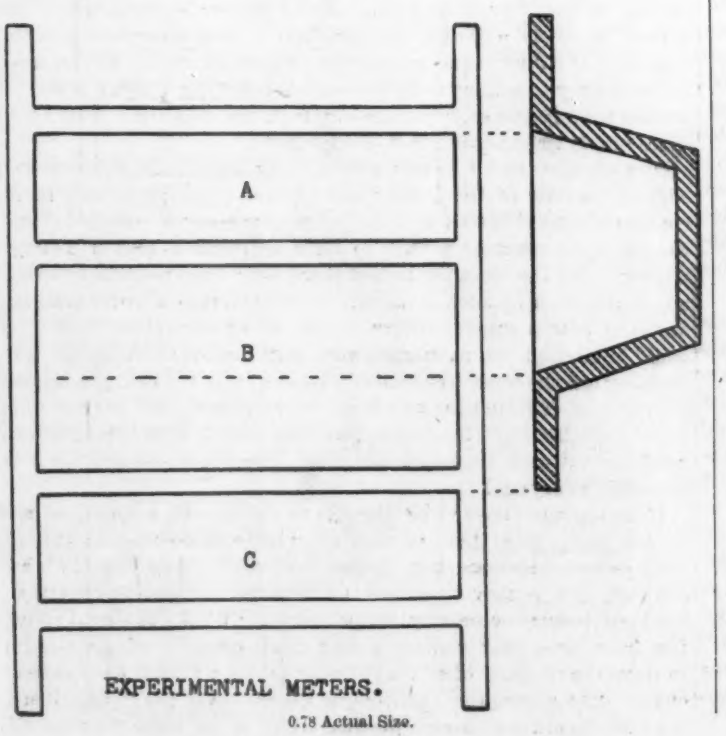
Better Design—More Uniform Flow. Ports Open Full.

0.82 Actual Size.

Relative Sizes of 30-Light Valves and Valve Seats.

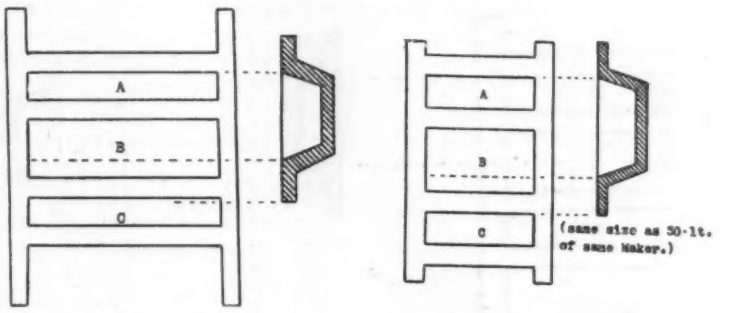


(Same size as 20-lt. of same maker)



0.78 Actual Size.

30-Light Valves and Valve Seats.

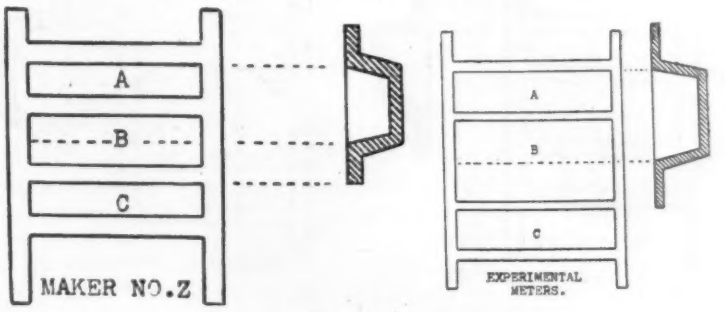


Poor Design—Too Quick Opening. Port Opening "C" Restricted.

Better Design—More Uniform Flow. Ports Open Full.

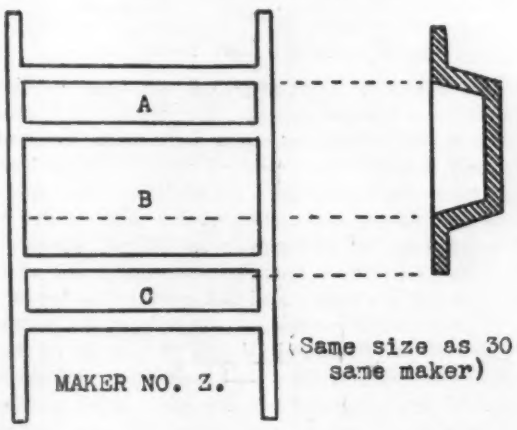
0.82 Actual Size.

Relative Sizes of 10-Light Valves and Valve Seats.

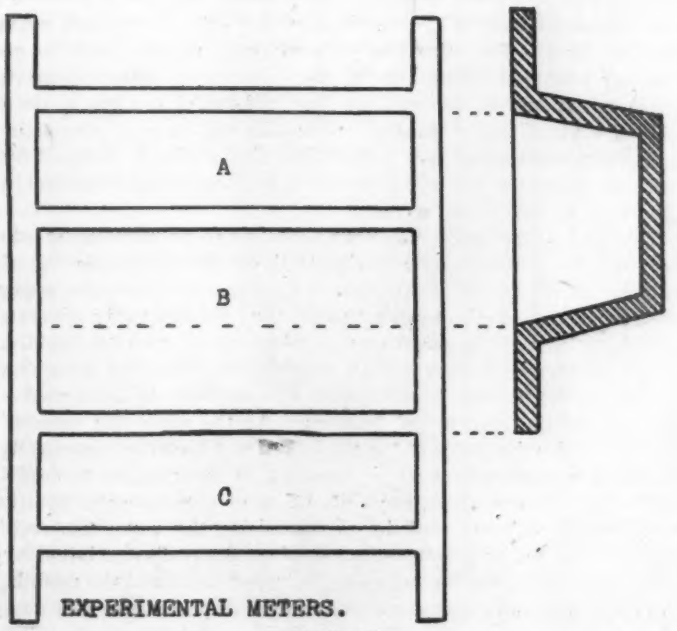


0.86 Actual Size.

Relative Sizes of 20-Light Valves and Valve Seats.

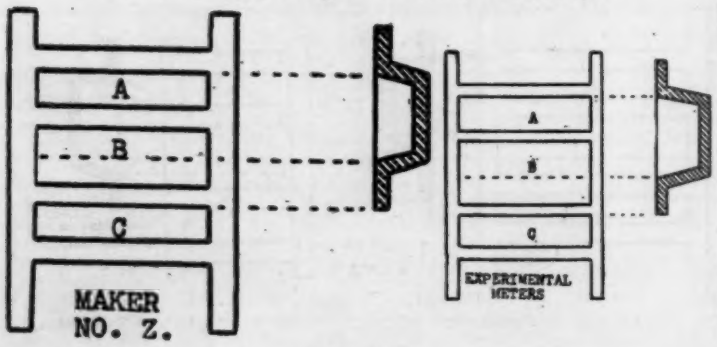


(Same size as 30-lt. of same maker)



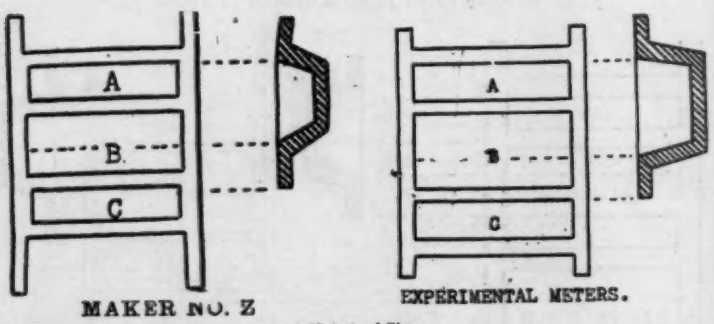
0.82 Actual Size

Relative Sizes of 5-Light Valves and Valve Seats.



0.96 Actual Size.

Relative Sizes of 3-Light Valves and Valve Seats.



0.95 Actual Size.

[Concluded from Page 886.]

Naphthaline Removal.[1]

By Mr. William Young.

It was also common knowledge, at the time of the devising of the Young and Glover patents, that mains and services partially blocked with naphthaline could be cleared by distilling into such mains and services the vapors of volatile liquid hydrocarbons —that these vapors condensing upon the surface of the naphthaline dissolved it so that it flowed to the nearest drip-pot. It was further believed and maintained that the vapors of such hydrocarbons as dissolved naphthaline in the liquid state had also a similar power while diffused through the coal gas as a vapor, and had even the power of adding to the tension of naphthaline vapors and preventing them being deposited out of the gas. We have maintained this view as one of the merits of the Maxim process of carburetting coal gas with benzol, carburine and similar volatile hydrocarbons, when the main object is to add illuminating power to the gas, and the vapors are never intended to condense into the liquid state. I had long been satisfied that this view was wrong, and on several occasions had drawn attention to evidence that the vapors of volatile hydrocarbons, while diffused through coal gas, had no such effect—that gas enriched with vapors could be passed through a mass of naphthaline crystals without dissolving them in the least, or without the vapors being dissolved out of the gas by the mass of naphthaline, that it was only when the vapors were present in the gas to supersaturation, and passed into the condition of liquid hydrocarbons, that they had any solvent action on naphthaline present in the gas or in the mains and services.

The Botley process of removing naphthaline by introducing into the naphthaline-charged gas a mechanically produced mist or fog of petroleum oil is a capital illustration of a process which was devised under the simple erroneous impression that, by thus mechanically dividing the petroleum through the gas, there would be confered upon the naphthaline vapors an increased tension, and enable them, instead of being deposited and giving trouble in the mains and services, to be carried right through to the consumers' burners. At the time this process was brought under the notice of the gas industry, I took the opportunity, by means of corrospondence which appeared in your pages, to show that, while the proccess might have the effect of preventing difficulties, it would not do so because of the oil fog raising the vapor tension of the naphthaline, but by the reverse action of tne finely-divided liquid oil particles constituting the fog reducing the vapor tension of the naphthaline and absorbing and dissolving it; that while the process has been designed upon erroneous ideas or beliefs as to the laws of vapor tensions, it might yet succeed in its object, because it (unconsciously to the designers) embodied the conditions necessary to success, inasmuch, as shown at the time, it enabled the oil vapors to absorb the naphthaline out of the gas, or dissolved the naphthaline deposited in the mains and services.

There was also the common knowledge relating to the physical laws bearing on the subject—that of vapor tensions and the solubility of vapors in fluids. For instance, it was well known that, on bringing a gas containing the vapors of various hydrocarbons having different tensions into contact with hydrocarbon liquids having a solvent affinity for these vapors but themselves giving off vapors of different tensions to those diffused through the gas, there was at once an exchange of vapors dependent on the relative tension of the vapors diffused through the gas and of those of the solvent liquids; and this exchange continued until there was an equilibrium attained between the solvent power of the liquid hydrocarbons to absorb the vapors from the gas, and of the gas to take up, in diffusion, the vapors from the solvent liquids. The law explains the practical observation in washing the shale gas with oil previously referred to—that so long as the quantity of the heavy oil was large, and brought into contact with the gas fractionally, the whole of the vapors were absorbed, because the balance between the oils to dissolve the vapors out of the gas, and of those vapors to remain in diffusion in the gas, was altogether and always in favor of the oil. When, however, the oil was not in sufficent quantity, the balance was disturbed, and those having the highest tension, possessing the greatest power to remain in diffusion, were absorbed to the least extent.

The foregoing law and observation showed that it was possible to absorb out of a gas containing the vapors of various hydrocarbons one of these vapors to the almost complete exclusion of the others, by maintaining a lack of balance between the constitution or composition of the solvent liquids and the particular vapor that it was desired to remove; so that the balance will always be on the side of the solvent fluid for the vapor which it is desired to remove out of the gas, while balanced for all others. Another physical law bearing upon our su bject is that relating to the condensation of the vapors of mixed hydrocarbons out of gas containing them. If it is desired to have the vapors of t wo or more hydrocarbon to condense simultaneously, they must be pr esent in the gas in such quantities that their vapor tensions shall approa ch each other. This is still more essential when one of the hydrocarbons passes direct from the state of vapor to that of a crystalline solid, as in the case of naphthaline; and where under such solid state it has no solvent affinity for the other vapors with which it is associated. With the more volatile hydrocarbon—such as benzol and carburine—the quantity of vapors that would require to be present in the gas before their tension was lowered to be equal to that of the quantity of naphthaline in the gas, would be so great that the gas would neccessarily smoke; and if present in less quantities, then these vapors would not condense out of the gas with the naphthaline. The result would be that the na phthaline would be deposited in the crystalline form. It is therefore evident that if it was desired to cause a liquid hydrocarbon to con dense along with the naphthaline without causing too great an enrichm ent of the gas, it would be neccessary to employ some hydrocarbon havin g a much lower vapor tension than benzol or carburine—in fact, one having a vapor tension more nearly approaching that of naphthaline.

Now the facts that I have narrated may have been common knowledge at the date of the Young and Glover patent; and they no doubt contain all the elements of knowledge fieccessary if combined and arranged into a concrete process to have anticipated that of Young and Glover. But the question is had there ever been previously described an aggregation of such common knowledge into a concrete process, showing how a supplementary supply of hydrocarbon fluid solvents could be so employed as to selectively wash out the naphthaline without washing out the other hydrocarbon vapors from the coal gas, or in carburetting or diffusing the vapors of hydrocarbon fluid having approximately similar vapor tensions so that they would, so to speak, selectively condense ont with the naphthaline and dissolve it and prevent it being deposited as crystal?

If Young and Glover were the first to devise such a concerted process by combining these items of prior knowledge, if they were aware of the wide range of hydrocarbon liquids that could be employed for such a purpose, and if they explained in their patent specification that the essential feature neccessary in the washing fluid was that it should be free from, or at least contain such a small quantity of, naphthaline as to leave the balance of solvent affinity in the washing fluid sufficent to enable it to absorb the naphthaline vapors out of the gas against their tendency to diffuse through the gas, while at the same time the solvent

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affinity of the washing fluid was balanced for all the other hydrocarbons present in the gas so that these were not absorbed, or, where so desired, that the washing fluid should contain an excess of hydrocarbons having a similar vapor tension to that of naphthaline so that the balance would be in favor of the gas to take them up in diffusion, or, alternatively, to diffuse through naphthaline charged gas the vapors of hydrocarbon liquid solvents having a vapor tension similar to, or approaching that of, naphthaline, so that they may selectively condense along with the naphthaline, dissolve it and prevent in giving trouble from being deposited in the solid form, and Young and Glover knowing the wide range of available fluids that could be employed in the way they described, they were surely entitled to claim the use of all of them. The correspondence that has since taken place—more particularly the claims made in connection with the origin of this correspondence—shows how valueless a narrower claim would have been.

Objection has been taken to the claims on the ground that, instead of being a definite claim specifying a definite solvent, they are so wide as to include all oil washing and corburetting processes applied to gas. The descriptive matter in the body of the patenet specification shows this is not the case; and the disclaiming clause of the specification distinctly says that Young and Glover "make no general claim to the washing of illuminating gas with liquid hydrocarbons for the purpose of absorbing the condensable hydrocarbons, nor yet do they claim the carburetting of coal gas by means of volatile hydrocarbons." The claims of the Young and Glover patent, quoted by Mr. J. Ferguson Bell in his communication appearing in your issue of the 1st inst, instead of being given *in extenso*, and of making the meaning of the claims clearer, as he says is his object, gives them a compass they were never intended to have; for he (for some reason best known to himself) omits, in the case of each claim, the important addition that the operations claimed were to be carried out "*substantially as described.*" These three words narrow much the scope of the claims. Why did Mr Bell omit them?

I have now, I hope, answered your query "What does that process compass?" and also said sufficent to show that the Young and Glover patent covers the Bell, Colson, and other similar applications of oil washing for the elimination of naphthaline from gas, and that Young and Glover are entitled, in connection with them, to something more tangible than credit. Although, however, thus speaking candidly and plainly - so as to remove the uncertainty that, if remaining, might militate against the application of a very useful system—I would regret much, and I have reason to believe my colleagues would also regret that the something more tangible than credit which we think we are entitled to get should have a deterrent effect in preventing the gas industry benefiting by our labors. As I have already said, our main object in securing a patent for our invention was to have a legal document clearly explaining the nature and result of our labors, entitling us to ask credit for what we had done in the solution of the naphthaline problem, and, further, in the event of the results of our labors proving of great value to the industry, of also asking a share of the resulting economy; and in this regard I may be permitted to refer to the passage in the article on Mr. Colson's process at Leicester, in which it is stated: "It is a fact that it is estimated that the new remedy will have the effect of adding at least £5,000 to the profits of the Gas Department." Assuming that Mr. Colson's estimate of the economies arising from the process to be correct; and freely conceding that he may have largely contributed to that saving by his own application of a modification of the process described and claimed in the Young and Glover specification, surely Young and Glover deserve an acknowledgment of their labors in the form of a small lordship or commuted rovalty.

There is another matter to which I would like to draw attention, which, if left unexplained, might have an even greater deterring effect or deferring effect upon the full adoption of the Young and Glover process than any small amount of lordship asked for its use. The washing of naphthaline out of coal gas should be looked upon as a purifying process just as much as the washing of gas with pure water for the elimination of ammonia, or the use of oxide of iron for the elimination of sulphuretted hydrogen. Now the efficiency of the latter two processes can be at once shown by allowing a jet of the gas, after passing through the purifying arrangement. to impinge on a slip of yellow turmeric paper, which, as is well known, at once turns brown if ammonia be present, or, in the latter case, a slip of acetate of lead paper, which is at once blackened if sulphuretted hydrogen be present. Further, should gas containing either of these impurities escape perfect purification, more particularly sulphuretted hydrogen, its presence is at once made manifest all over the district of supply by the smell; and on the defective purification of the gas being rectified, the cause of complaint shortly disappears.

In the case of naphthaline purification, the conditions are in many respects different. There is no ready method of testing for the presence of naphthaline, such as for ammonia or sulphuretted hydrogen; for though the ingenious test devised by Dr. Colman has greatly simplified matters in this regard, the test for naphthaline still requires considerable skill to apply it—so much so that, in many cases, when oil washing for naphthaline has been tried, no test for the presence of naphthaline has been applied further than freedom from trouble from deposits of naphthaline in the district of supply. If the naphthaline, escaping the washing process and accompanying the gas, remained in the gas, and made itself manifest at once over the district of supply, as in the case of sulphuretted hydrogen, such a test for the presence of naphthaline would have been evidence that the washing process was not a success; but owing to the naphthaline possessing the power of leaving the gas and being deposited as a crystalline solid, and of revolatilizing again into the gas, such a test as that referred to is no reliable evidence of the effectiveness of the oil-washing process.

To go into anything like a detailed explanation of the method in which naphthaline behaves so as to bring about trouble from being deposited in the mains and services would extend this communication to a greater length than permissible, and, besides, it is scarcely necessary, as I have already fully described such action of naphthaline in the paper I had the honor to communicate to the Incorporated Gas Institute, on "Naphthaline from Retort to Point of Deposition," to which I refer those interested in the subject. Meantime, it will be sufficient for my purpose to give a practical illustration of the error that may be committed in applying such an apparently reasonable method of assessing the value of a naphthaline remedy process as that referred to.

The Sheffield Gas Works have for a long period of years had great difficulties from the presence of naphthaline in the gas depositing in crystalline form; and those interested in getting over these difficulties have tried, and abandoned, a great number of methods or processes which promised to relieve them of their troubles. Among others, they have tried the Young and Glover process referred to by Mr. Ferguson Bell in his late communication as having turned out a complete failure, and, later still, other modifications of the Young and Glover process, but under other names, one of which has also turned out a failure, and I have no doubt, under like conditions, all others will unless there is a change in the method of testing their efficiency. We were told a considerable time ago that those in authority at Sheffield were hopeful they had at last discovered a remedy for their naphthaline troubles, consisting in the hot condensation of their gas, or rather restricting the temperature at which the gas was condensed to about 70° F. Now we have seen the effects of hot condensation in the case of the Aitken and Young analyzing process, how that instead of reducing the naphthaline present in the gas, it rather tended to load the gas wtth naphthaline to such an extent as to ultimately partially block up the terminal chamber and connecting mains with masses of crystalline naphthaline; and there can be little doubt that, during the whole time the gas was leaving the condensers at 70° F., it would be passing away so loaded with naphthaline that it would deposit it when the gas was subjected to lower temperatures. The reason why such naphthaline did not give immediate trouble was, I have no doubt, because, during the time the experiment was being made, the temperature conditions were such as to permit of it being deposited in positions not causing immediate trouble—such as the gasholder, trunk mains, etc., in the manner described in the paper contributed to the Gas Institue to which I have referred. That such depositions of naphthaline can take place is well known, as there are instances where tons of naphthaline have been removed in similar conditions.

Suppose, now, the temperature conditions to change in such a manner as to prevent the naphthaline present in the gas from the hot condensation being deposited in the same positions as before but be carried forward in the gas till the lesser and more exposed mains and services were reached, when, the temperature being low, it was deposited, it would at once begin to give trouble. Faith in hot condensation would then be shaken. But the temperature conditions might still further change; and part of the naphthaline previously deposited might revolatilize into the gas, when, in consequence, the trouble from naphthaline being deposited in the smaller mains and exposed services would be greatly intensified. Then, in all probability, faith in hot condensation would be lost, and the ordinary process reverted to. Now, suppose that, with their works and mains under such conditions, the Sheffield Gas Company were to introduce into their works a naphthaline removal process such as that of Young and Glover, and that, immediately after the introduction of this process, temperatures should again change into the original conditions, and, further, assuming that

the Young and Glover process was being properly worked, and that the naphthaline was removed from the gas, then the purified gas on entering the mains and coming into contact with the previously deposited naphthaline, would reassert its power to take up in diffusion some of it, but the temperature conditions being such as not to load the gas with naphthaline to an extent sufficient to cause its subsequent deposition in the smaller mains and services, the process would be given the credit it deserved.

The period of the year would, however, again come round when the temperature conditions would again change, and become such that the gas which had been perfectly purified from naphthaline by the Young and Glover process, on coming into contact with the previously accumulated naphthaline, would be able, owing to the higher temperature, to take up such a quantity as to cause it to redeposit some of it in the lesser and more exposed mains and services; and as the true cause of such deposits was not understood, the process would be condemned and discontinued. It is the power possessed by the naphthaline of being deposited from the gas at lower temperatures in positions, not making its presence manifest by giving trouble at one period of time, and the revolatilizing of that same naphthaline back into the gas, to be carried forward and be redeposited out of the gas in the more exposed mains and services under altered temperature conditions, which makes troubles from naphthaline deposits so puzzling and difficult to understand; and it will be evident from what has been said that, however perfect an oil-washing process may be in purifying the gas from naphthaline, the troubles from naphthaline deposits may, after its adoption, from time to time recur (dependent upon temperature conditions), and continue for a length of time dependent upon the accumulations of naphthaline in the trunk mains, gasholder, etc., prior to the adoption of the oil-washing process. When, however, the oil-washing process is supplemented by, or combined with, the carburetting of the gas with the vapors of liquid hydrocarbons, solvents having similar vapor tension to that of naphthaline, the troubles from previous deposits of naphthaline are more quickly removed; and this is more particularly the case when an excess of the vapors of those solvents is volatilized into the gas so as to cause a portion of them to condense out upon the surface of the previous deposits, as by this means not only is the naphthaline which may be revolatilized into the gas prevented from being redeposited in the solid form, but the naphthaline deposits are soon dissolved by the condensed excess vapors of the liquid solvent, and run to the nearest drip pot for removal.

These remarks will explain the apparent failure of the Young and Glover process in the instances referred to in the recent correspondence on the subject in the *Journal*. Possiby, however, after Mr. J. Ferguson Bell has, as promised in his letters appearing in your issues of the 11th and 18th ult., "entered more fully into the application of the use of natural solvents obtained from coal tar for the removal of naphthaline deposits," and given "the results of his tests for naphthaline and solvents in the gas at various points, along with the experiments in washing with tar oil obtained from blast furnaces, creosote, paraffine, etc., extending over many months at Derby," we may be in a better position to arrive at the true cause of the failure there and at the many other towns. Meantime, however, I wish to put on record that my confidence in the Young and Glover process is quite equal to that of my colleague, Mr. Thomas Glover. The process is founded upon well proved scientific principles, which, if persistently applied in the manner described in the specification of the patent, will, I maintain, on whatever reputation I may possess, prove a perfect remedy for the worst naphthaline plagued distributing system in the country.

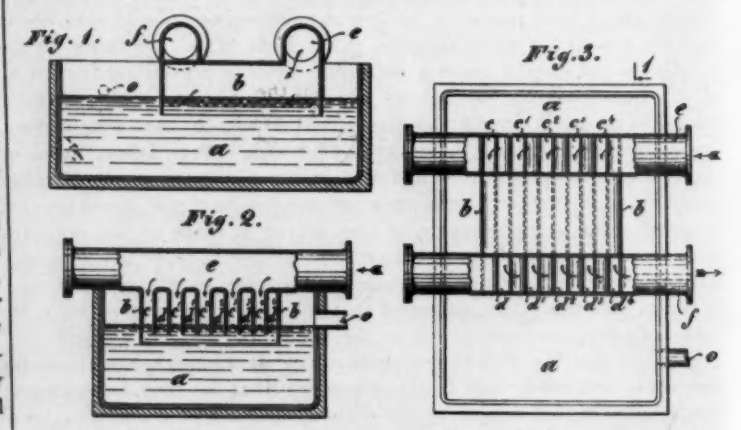
The Brunck Process of Extracting Ammonia from Distillation Gases.

On November 1st, United States Letters Patent, No. 773,784, were issued to Mr. Franz Brunck, of Dortmund, Germany, for a "new and useful process of extracting ammonia from distillation gases." Using the words of the specification:

The invention relates to the extraction of ammonia and its compounds from the gases evolved during the dry distillation of coal, brown coal, wood, peat, and other substances, especially from the gases produced by the carbonization of coal, either in gas works or in coke ovens.

It is known that in order to extract the ammonia and its compounds from the distillation gases the latter are either treated with dilute acids or with water, which latter process is now in use on a large scale. With the first process large quantities of the absorbing acid are required, and to obtain therefrom the absorbed ammonia, in the form of solid salts, these large quantities of dilute acid have to be concentrated, which not only causes a great cost for fuel, but also necessitates an expensive apparatus. With the other process the disadvantages are by far greater. It requires large quantities of water, and the free ammonia has to be fixed by the addition of acids, and the dilute solution must be concentrated, or the liquor is, as most in use, mixed with lime and distilled to drive out the ammonia, which is absorbed anew by means of water or acids.

It is the object of this invention to do away with those deficiencies and to obtain solid ammonia salts in a direct way—that is, from the hot gases themselves without previously removing the vapors of water and tar contained in these gases. To this end my improved process consists in conducting the hot gases without being deprived of the vapors of water and tar in a fine state of division through suitable contrated acids—for instance, concentrated sulphuric acid—and maintaining the temperature of the absorbing acid so that no condensation of the water vapors can take place, whereby the absorbed ammonia is separated in the form of solid salts. The salt is baled out in the ordinary fashion or in any other way, and fresh acid is supplied when needed. The acid must be kept at a temperature of at least 80° to 85° C., so as to prevent the steam contained in the gases from condensing. The temperature may preferably be maintained by the hot distillation gases themselves and is regulated by previously cooling the gases as needed. In other cases the acid may be heated by means of indirect steam, utilizing for this purpose, for instance, the exhaust steam of the engine. In order to avoid stoppages in the path of the gases, the separation of the solid salts is preferably effected in open vats only. After leaving the latter the gases may also be treated, if necessary, in other absorbing apparatus of any known construction—such as washers, scrubbers, or the like—in order to remove the last traces of ammonia. In this case only as much ammonia is to be absorbed by the acid as will cause no salt deposits and stoppages in the closed apparatus. This acid is then run into the open vats, in which the salts settle in the manner above described. The same treatment may be applied prior to conducting the gases into the vats. When proceeding in this manner, the gases are also previously cooled as needed before entering the said absorbing apparatus. The accompanying drawings illus-



trate one form of carrying out the present invention. Fig. 1 is a longitudinal section through line 1 1, Fig. 3. Fig. 2 is a transverse section; and Fig. 3 is a plan, part of the pipes *e* and *f* being broken away.

The receiving vat *a* is filled with concentrated acid—for instance, sulphuric acid—in which the vessel *b* is immersed, the latter being open at the bottom and divided into a number of compartments $c\ c^1\ c^2\ c^3\ c^4$ and $d\ d^1\ d^2\ d^3\ d^4$, the partition sheets of which are serrated at the open side of the vessel *b*. Across the top of these compartments there are two pipes *e* and *f*, the former communicating with the compartments $c\ c^1\ c^2\ c^3\ c^4$ and the latter with the compartments $d\ d^1\ d^2\ d^3\ d^4$. The gases are first conducted into the chambers $c\ c^1\ c^2\ c^3\ c^4$ through the distributing pipe *e* and then pass through the acid below the serrated partition sheets, with the effect of being finely divided. They now enter into the chambers $d\ d^1\ d^2\ d^3\ d^4$ and are thence led off through the collecting pipe *f* The ammonia salt settles on the bottom of the receiving vat and is baled out at intervals. If necessary, the salt is freed from any tar particles by washing it with a saturated solution of the same ammonia salt. The small quantity of tar condensed on the surface of the acid during the process flows off continuously through an aperture *o* in the vat *a*.

If according to the one method now in use the gases are treated with diluted acids, the solution must be strongly concentrated in order to recover the solid salt. In comparison with the other system of washing the gases with water as almost universally adopted, a still greater advantage is secured by this improved process, because the ammonia is extracted directly in the shape of solid salts. In the other case very large quantities of water are required for extracting the ammonia completely. If the ammonia is then fixed to the acid, the solution must be concentrated, so as to obtain the ammonia salts, or the ammoniacal liquor has to be subjected to distillation with lime.

A further important feature of the process is the fact that the nuisance hitherto caused by the exhausted liquor and foul lime is now done away with, so that the ammonia works are no longer put to heavy expense for the removal of these offensive matters.

In order to show the economical advantages of my invention, both as regards the cost of erecting plants and their simple and cheap working, the carbonization of coal with by-product recovery—tar and ammonia—may be quoted as a striking example. The capital amount invested in an ordinary installation of 60 coke ovens constructed on the new system will be about $17,500 less than at present. The working and maintenance of the plant will allow of still greater economy, as up to $7,750 are saved per annum, which is equivalent to nearly 40 per cent. of the present working expenses. As to the manufacture of illuminating gas a great advantage is attained by the highly reduced number of coolers and washers. Moreover, the treatment of ammoniacal liquor in stills is avoided, so that the steam required for this purpose is now saved. The claims are:

1. The process of extracting ammonia from gases produced in the dry distillation process, which essentially consists in conducting the hot gases without being deprived of the vapors of water and tar in a fine state of division through concentrated acids in open vessels, regulating the temperature of the acid to at least 80° to 85° C., removing the tar from the surface of the acid, baling out the deposited solid salts, and supplying fresh concentrated acid, substantially as and for the purpose stated.

2. The process of extracting ammonia from gases produced in the dry distillation process, which essentially consists in conducting the hot gases without being deprived of the vapors of water and tar in a fine state of division through concentrated acids in open vessels, regulating the temperature of the acid to at least 80° to 85° C., removing the tar from the surface of the acid, baling out the deposited solid salts, extracting the last traces of ammonia from the outgoing gases by special treatment with concentrated acids and conducting the resulting mixture of ammonia salt and concentrated acid into said open vessels, substantially as and for the purpose stated.

The Education of the Apprentice.

[A paper read by MR. J. L. KETCHAM, of Indianapolis, Ind., at the last meeting of the National Founders' Association.]

A trade school has been started at Indianapolis. The trades offered this year are carpentry, bricklaying, plastering, house painting, electrical work, lithography, foundry and forging. This school is new, but it has good backing and will have an adequate endowment. Its history is brief but interesting.

The United States Government owned 75 acres of land within the city limits of Indianapolis. This land is undulating, covered with forest trees and is beautiful for situation. It was an arsenal, and there are a group of buildings on the land erected by the United States Government at a cost of $350,000. The Government proposed to give up this arsenal and sell the property. Vice-President-elect Chas. W. Fairbanks suggested that the property be bought for a trade school. (The ground was too beautiful to be split up into town lots and the buildings were too good to be torn down. When the United States Government builds it puts up substantial buildings. It does not build in a rush and use any material or workmen to hurry completion, as is often done by individuals impatient for returns. Uncle Sam has educated engineers in his army officers, who take time to erect and take pride in erecting buildings of the best possible character.) A large number of citizens of Indianapolis, appreciating the suggestions of Mr. Fairbanks, bought these arsenal grounds and buildings of the United States Government at public sale, paying therefor $154,000 cash.

It had been previously arranged that the property would be turned over to the Winona Technical Institute, a school already established, conducting an agricultural institute at Warsaw, Ind. At the head of the Warsaw Agricultural Institute, and now at the head of the Indianapolis Trade School, is Rev. S. C. Dickey, D.D,, who has enlisted in his work some of the wealthiest men in the West, chiefly from Pittsburg, Chicago and Cincinnati.

Let me give a brief account of these men, in order that you may see for yourselves that the school has a substantial start. The President of the school is Rev. S. C. Dickey. Suffice it to say of Mr. Dickey that he was a poor boy, worked his way through Wabash College, borrowing money when a student to aid him and afterward repaying with interest all borrowed money, poor as he was. He started the agricultural school at Winona and managed it with such success that men of large means came to his support. Here are some of the other officers of the school: J. M. Studebaker, South Bend, Ind., 1st Vice President; H. J. Heinz, Pittsburg, Pa., 2d Vice-President; H. H. Hanna, Indianapolis, Chairman Executive Committee.

J. M. Studebaker you all know to be a man of large means, large sympathy and practical experience in handling boys and men in making vehicles of all kinds. H. J. Heinz is a millionaire deeply interested in the school, as are also Major A. P. Burchfield, H. J. Torrence, H. J. Porter, S. P. Harbison, all of Pittsburg Pittsburg foundrymen know these men, and know that they are men to carry out their plans and have means to push the work of the school to a finish. There are on the Board of Trustees men from other cities, such as Stanley McCormick, of Chicago; Walter M, Smith, of New York, Alexander McDonald, of Cincinnati.

I name these men, not to boast of their wealth, but to demonstrate to your satisfaction that this Indianapolis trade school, called the Winona Technical Institute, is a success from the beginning. Although only a year old, Dr. Dickey tells me that it has this start, namely: Contributed by Indianapolis citizens, $133,000, and by others, $21,000, which money bought the property from the Government; given by Indianapolis citizens and others, 15 gentlemen, $10,000 each, $150,000; maintenance fund, 20 men, $5,000 each, $100,000; Mrs. Phelps, of Kentland, Ind., $25,000. Dr. Dickey assures me he has been shown wills made out by elderly gentlemen with no heirs to the amount of $2,000,000 to be left to the school.

The names of men in Indianapolis on the Executive Committee and the Board of Trustees are a guarantee of success. I will not take your time for further comment along these lines. This school proposes, among other things, to teach boys to be molders. That is what interests you and me. The school is not a local affair. I have shown you that the United States Government sold the property cheaply because it was bought for a trade school. Senator Fairbanks, Senator Beveridge, and Congressman Overstreet, by their efforts and by their eloquence, induced Congress to let valuable property go for less than it was worth because of the proposed school. The whole United States has thus indirectly an interest in the school. You have stock in it and it will pay you dividends in furnishing you with better molders than you have. The education of the boys in our foundries, under the present system of apprenticeship, is not the best. I need not tell you that. You know it.

I remember some 12 years ago in my own foundry the graduating exercises of the apprentices. Each apprentice as he finished his time was required to treat. The treat consisted of several kegs of beer, which an apprentice was required to buy for the journeymen molders to celebrate his "commencement" as a journeyman. The premium of $100 earned by the apprentice was thus cut down to $80, $20 being spent in such enlightened "commencement" exercises. To do the molders justice, I will say that they were finally amenable to reason and agreed with me that the custom was barbarous and scandalous and gave it up. Nevertheless, there are yet objectionable customs and practices. A trade school will teach a boy not only the art of molding but also good morals, and the art of the "open shop."

The average organized molder, we will assume, has one son. Eight molders have eight sons. One of the eight is permitted to learn a trade. What becomes of the other seven boys? A student of sociology in the Columbia University tells what becomes of them. The situation was carefully investigated in New York. It was found that, although iron molders allowed one apprentice to eight journeymen, marble cutters one to ten, and so on, many labor unions would not allow any apprentices. In consequence there are 150,000 boys between the ages of 16 and 21 loafing about the slums of New York city.

Is there not a need for trade schools? Shall we permit the door of opportunity to be thus shut in the faces of our boys? When a trade school was started in New York 10 years ago, it was viciously opposed by organized labor. To-day the apprentice question is one for the trade school, and not for organized labor, to solve.

Let me present the question to you in a concrete form. Let me tell you what has been done by a kindred trade, and thus demonstrate conclusively what can be done by our trade.

The lithographers of the United States found it difficult, well nigh impossible, to get apprentices. Their work they found suffering. The union reserved the right to select apprentices, and they selected only a few and only such as were amenable to union rules. The atmosphere of union rules and practices was poisonous. I am telling what the lithographers told me. Something, they said, must be done. They decided to start a trade school of their own. But fortunately for them, this trade school at Indianapolis started up, and the lithographers decided to join hands with Indianapolis, and assist the branch of the school known as the branch of lithography. Belonging to this Western Lithographers' Association there are 50 houses from 16 different States. Widely scattered as they are, their interests are centered in this trade school in Indianapolis, with three trustees to manage for them—namely, Julius Gugler of Milwaukee, Chas. B. Goes of Chicago and Louis H. Levey of Indianapolis. Mr. Levey writes me as follows:

I am sending you by to-day's mail a copy of the Winona school of lithography booklet. This branch of the institution will be run under the auspices or the American Lithographers' Association, West, they having three members on the Board of General Directors, and they to have charge of the lithographic school. This assures me that the school will be run along practical lines and that a sufficent number of bright boys will in time be trained into first-class lithographers. The Lithographers' Association, West, will furnish about $5,000 in equipment for this school without cost to themselves. If you are interested on behalf of the Founders' Association I would like to talk the matter over with you at your convenience.

I asked Mr. Levey what he meant by saying that his association would furnish the school $5,000 in equipment without cost to themselves. He was surprised at my question. He thought foundrymen were up to date. "Why," he said, "we went to the supply men and held them up for tools and machinery, etc." I replied that foundrymen knew nothing about "hold up" methods; they were strictly virtuous and would not be guilty of such practices.

Seriously, gentlemen, the success of the Western Lithographers' Association ought to inspire us to do something of the same kind. They started their branch school of lithography. Our school of foundry practice is already started. The object of this appeal is to enlist your sympathy and support. The foundry to which I belong, the Brown-Ketcham Iron Works, has signed an obligation to give $100 each year for 5 years for equipment. The cards I would like to have you sign are for maintenance. If each of you will give $100 a year to this trade school, for maintenance, your $100 is loaned to some worthy boy to enable him to get through his apprenticeship in the foundry department of the school. He signs a note. The note given by the boy for your money is payable to the school on or before 10 years without interest. Dr. Dickey tells me he worked his way through Wabash College thus, and paid back to the college the money loaned him, and paid it with interest. It was, he says, the happiest day of his life when he paid the last dollar of that note. Very few of the notes are not paid, the doctor says. The boys are taught to be honest. Integrity is instilled into them and they struggle on until every dollar is paid back. Bear in mind, the money is not paid back to you. It is paid back to the trustees of the school and is then loaned to another boy. This is the only perpetual motion machine I have ever heard of. You pay into the Winona Technical Institute of Indianapolis $100 for 1, 2 or 3 years as you like, and that $100 goes to a boy who learns to be an intelligent molder, and, while he learns his trade, is surrounded by Christian influences. After he graduates and as soon as he can earn it, the same $100 you gave goes to another boy, and another and another.

What a fountain of usefulness you open up! It sparkles in the heart and glistens in the eyes of the lad who gets it. His life is cheered, comforted and made useful; then another heart is cheered and another life made useful—all with this first gift of yours.

We have all read that fascinating story, "The Call of the Wild"—a boy denied apprenticeship by organized labor is surronded by such adverse conditions that the call of the wild is daily, hourly with him. Idleness soon becomes vice, and the boy, who might have been an honest workman, becomes first a criminal, then a brute. The appeal to us is from the boy himself. Do you not hear his cry? "I am locked out by union rules. Give me a chance in life! Am I doomed to beg, starve or steal?"

The Electric Heating Situation.

Electricity in editorial comment on this topic remarks: The world is continually asking why electric heating is not in vogue in place of stoves and steam heat. They say it is hygienic, compact and under control with a touch of the button. We confess that all this is true and even more. It represents a return of 100 per cent. for the power consumed. This being the case why is electric heating for homes and hotels so dilatory in coming to the front? Is the public to blame or is the electrician? Let us find out by examining the situation from a common sense standpoint.

A triple expansion engine supplying power to the generators of a lighting and power plant has a net efficency of about 14 or 15 per cent. This means that for every hundred weight of coal consumed about six-sevenths goes up the chimney in smoke. Or to be more accurate the heat energy is largely wasted through radiation and the familiar influences which pull down the general efficency of a steam plant. When the remaining one-seventh emerges, after having passsd through various channels of transformation, it appears as electricity. In this form it may be considered in connection with the problem of electric heating.

Here is the case in a nutshell: In a heating system which provides hot air or burns the coal in stoves, radiation of the heat is just the thing desired, and if steam heating is employed here again radiation of the heat into the room is all right. In these cases there is, as heat, a much greater return for the coal burnt than if its energy had been passed through various devices which give us electricity in the end, which is then again transformed into heat in the electric heater.

Coal burnt directly in stoves to give heat yields about twice as much heat at least, for a given number of pounds, as when its energy undergoes a variety of changes which culminate in electric heat.

The trouble is not with the heater, neither can it be found in connection with the power, because, as already stated, the return in this case is 100 per cent. The difficulty is with the cost of electricity. Selling electricity at so much an ampere hour or so much a horse power hour means charging at least 4 cents for every 4 or 5 pounds of coal burnt. The heat obtained by electrical means from this handful of coal is not sufficent to pay for its use in this form.

A hundred weight of coal burnt in a stove warms a room of moderate size very well in cold weather. Turned into electrical energy one hundred weight of coal yields about 15 horse power hours. This cannot give the requisite heat, and cannot compare in heat giving capacity even with 100 per cent. electric heaters, from a financial standpoint, with the old-fashioned method. The trouble is, as already stated, a dollar and cents one. It is entirely due to the heavy cost of electricity.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE proprietors of the Los Angeles (Cal.) Gas and Electric Company have notified their customers that, until further notice, the gas rate will rule at 90 cents per 1,000 cubic feet, net. The concession goes into effect the 1st prox. That is a very low rate for gas of the quality supplied in Los Angeles; in fact, it would be a low rate 2,000 miles this way, all things considered.

THE Gas Machinery Company, of Cleveland, O., has been authorized to install a new set of purifying boxes of the Chollar type on the works of the Carlinville (Ills.) Gas Company.

THE authorities of Mexico, Mo., have formally granted a franchise to William McCabe and associates for the operation of a gas works in the place named. The day set for a special election of the voters in respect of the proposition is the 2d prox.

A CORRESPONDENT in Philadelphia, writing under date of the 3d inst., incloses the following: "This week the Borough Council of Chambersburg opened bids for the sale or lease of the electric light plant owned by the Borough. R. Manderson, counsel for a syndicate of Philadelphians, bid 15 per cent. of the gross receipts for a lease, and W. W. Levering, for the Gas and Electric Development Company, also of Philadelphia, bid 10 per cent. of the gross receipts. Both set prices for municipal lighting for the purchase, with rates set for private lighting. Certified checks for 10 per cent. of the amount of the bids were filed. The bidders were: T. M. Nelson, Chambersburg, $65,000; E. E. Foust, for Chambersburg syndicate, $61,550; Charles Walter, for clients,

$75,550; J. L. Blackwell Company, Baltimore, $66,650; Grier L. Hersh, York, $72,575. Action was deferred.

WE are indebted to the Gas Congress Committee for a copy of the "Proceedings of the Congress of Gas Associations of America," held at the Louisiana Purchase Exposition, June 15 and 16. The book has within its covers a well arranged and cleanly printed story of the Congress.

WE are indebted to Mr. N. G. Hock for the information that the plant and franchises of the Greeley (Col.) Gas Company were sold at Public Trustees' sale the morning of Tuesday, November 29th. Mr. B. D. Sanborn, acting for himself and others, bid in the properties at $9,583.75, which sum practically represented the indebtedness. The purchasers will reorganize the Company's finances, and will put the plant in good shape. It will not require much of an expenditure, however, to pay for the latter.

MESSRS. LYONS and Chase (the former is a resident of Houston, Tex.) are said to be anxious to secure a franchise for the operation of a gas works in Belton, Tex. We know a great many capitalists who would keep their money clear of that particular proposition.

MR. GEORGE G. RAMSDELL, as Receiver for the Nassau County (L. I.) Gas Company, has applied for the right to place gas mains under the Merrick road, from the east line of Rockville Center, to and through the latter village to the westerly line thereof. The matter was referred for report to Supervisor G. V. Brower.

MR. J. L. BRADY, of Georgetown, Ky., has been appointed by the Governor of Kentucky as special Judge to hear the case of the Covington Gas and Lighting Company vs. the City of Covington, which case involves the construction of a contract, and in which case the equity sought for establishing by the city puts one in mind of the right that a highwayman has to fell the wayfarer.

AT the annual meeting of the Woodbine (Ia.) Gas and Lighting Company the officers elected were: Directors, H. A. Kinney, S. B. Kibler, H. B. Kling, H. M. Bostwick, F. Robbins, J. A. DeCourcey and Lewis Haas; President, H. A. Kinney; Vice-President, H. M. Bostwick; Treasurer, F. Robbins; Secretary, Lewis Haas.

A CORRESPONDENT in Newark, N. J., writing under date of the 2nd inst, forwards this: "Mr. Philip N. Jackson, who has secured a controlling interst in the Orange County Gas and Electric Company, of Middletown, N. Y., which city has a population of over 16,000 souls, announces that he will reorganize the Company, and offers other bondholders an opportunity to come into the scheme on the same basis as himself. Mr. Jackson controlled the concern several years ago, made money in operating the plant, and sold out at a profit. The purchasers sold to other parties who got into financial difficulties by engaging in outside enterprises, and when the property was recently sold under foreclosure Mr. Jackson bought it in. The authorized capital stock of the Company is $300,000, and the bonds amount to $300,000, of which $114,000, was issued to take up a prior mortgage on the gas plant while $86,000 were kept in the treasury and $100,000 sold. Mr. Jackson proposes to reorganize the concern as the Orange Lighting Company, with an authorized capital stock of $100,000 and $300,000 of bonds, of which $114,000 will be used to wipe out existing indebtness and $86,000 applied for improving the plant. Every holder of bonds who surrenders a $500 bond, together with $100 cash to the Fidelity Trust Company of Newark before December 10, will receive a $500 bond of the new Company after it is organized, and have also the privilege of taking the new stock at 80 per cent. of par for cash. Some of the bonds of the old Company are held in Newark and Essex county, but none of the old stock. Mr. Jackson, who has been very successful in electric, light and power business, is confident that he can make the reorganized Company a profit-maker."

THERE seems little doubt of the fact that the New Brunswick (N. J.) Gas Company has been absorbed by the Public Service Corporation of the State of New Jersey.

SUIT has been instituted by the proprietors of the Millville (N. J.) Gas Company against the authorities of Millville for damages done to the gas mains of plaintiff through gross negligence of the contractor constructing a sewer system for the borough account.

THE Hudson County (N. J) Gas Company has applied to the Governors of the New York Stock Exchange for the listing of $1,100,000 additional first mortgage 5's, due 1949.

TULARE, Cal., is to have a gas works, if the voters subsequently ratify a 50-year franchise recently granted for such an enterprise to Messrs. Clarence L. Smith, Wm. Kettner and S. Pedersen.

MR. EARL KING has resigned his position with the Denver (Col.) Gas and Electric Company in order to assume a responsible place in the service of the Binghamton (N. Y.) Electric Company.

THE gas plant at Excelsior Springs, Mo., has been shut down. It may be reconstructed in the spring of 1905; for it certainly would have to be reconstructed before it could be resuscitated.

MAYOR SWEENEY, of Wheeling, W. Va., says there is no truth in the assertion that any improvements on the city gas plant are under consideration. More's the pity.

MESSRS. E. A. WHARTON, J. B. Anderson, S. N. Higginbotham and O. C. Barner have applied for the right to build and operate a gas plant in Manhattan, Kas. The concern is to be known as the Manhattan Gas Company and it is capitalized in $50,000. The field looks a promising one.

MR. J. D. BROODER has been appointed Manager of the Lead-Deadwood (S. D) Gas Company.

IT is reported that an artificial gas plant will be constructed next year in Decatur, Ind.

AT a recent meeting of the Directors in the Warren (O.) Gas Light Company Judge S. W. Smith, Jr., of Cincinnati, was elected President, vice the late Wm. R. Stiles. Mr. George H. Tayler was re-elected Treasurer, Secretary and Manager.

"M. T. S.," writing from New London, Conn., says that a correct list of the officers chosen at the last meeting of the New London Gas and Electric Company is: Directors, B. P. Learned, F. R. Brandegee, Jas. Hislop, A. M. Young, M. J. Warner, G. E. Terry and W. G. Bushnell; President, James Hislop; Vice-President, B. P. Learned; Secretary, W. G. Bushnell; Treasurer, A. M. Young.

THE following is the text of the decision of the Massachusetts Board of Gas and Electric Light Commissioners respecting the petition for a revision of the rates charged for gas by the Newburyport Company:

"This was a petition by the Mayor of the city of Newburyport, pursuant to a vote of the City Council, against the Newburyport Gas and Electric Company complaining of the price of gas and asking that it be reduced. The present net price is $1.50, which was fixed April 1, 1900.

"The Company supplies both gas and electric light and the output of the former during the last fiscal year was about 24 million feet. There has been no increase in the capital stock since 1890. The amount now outstanding is $140,000. About 2 years ago the control of the corporation passed to the present owners who have greatly improved and extended the plant, and the cost of this work has so increased the Company's indebtedness that it is now nearly $110,000.

"For several years the business of the Company has been only moderately profitable and since 1899 its dividends have averaged a fraction less than 6 per cent. per annum. During most of this period, however, there has been a gradual improvement in the Company's affairs and a substantial increase in output has come since the property has been in the hands of the present owners.

"The statement of the Company's operations for the last fiscal year shows a surplus, after payment of interest and dividends, altogether too small either for a reduction in price or even for the regular and safe conduct of the Company's affairs. A careful scrutiny, however, of the operating accounts discloses the fact that they contain numerous items incidental to the plant improvements already referred to, and, while these may have been properly and necessarily included, they are not likely to be repeated and their absence from future statements will make a substantial increase in the Company's apparent profits. On the other hand, this increase will be in some measure offset by an increase in the interest charges due to the growth of the floating debt.

"Giving due weight to all these facts, the conditions which surround the Company at the present time seem to permit only the reduction in price which is named by the Board. The Board recommends that on and after the 1st day of December next the net price for gas supplied by the Newburyport Gas and Electric Company shall not exceed $1.40 per 1,000 cubic feet. For the Board, FORREST E. BARKER, Chairman."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

MONDAY, DECEMBER 12, 1904.

The Market for Gas Securities.

The vicissitudes of those who deal in shares were well manifested this week. Faith gave way to despair, although everything that counts for "stable" worth was favorable. Mr. Roosevelt had been elected President, it had been shown that Mrs. Chadwick held no Carnegie notes, money was easy, and it looked certain that prosperity reigned, in so far as outward indications went. However, the blot on the local horizon was an attempt to hold up to scorn Consolidated gas, through Mr. Hearst's objection to the fact that the Consolidated Gas Company should be paid for lighting the city under the terms prescribed by the laws of the State of New York. However, the "cut" in Consolidated was not so great. The "slump" leaves Consolidated at 209½ to 209¾. Other city shares, particularly Mutual, are strong.

Brooklyn Union is 212 to 220; Baltimore Consolidated is 86 bid, and it will be bid higher; Peoples, of Chicago, is 107¼ to 108, despite the frenzied appeals of certain people interested in local electrical lighting interests; and Bay State is in the hands of Addicks-Lawson, et. al.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

DECEMBER 12.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	209⅛	209¼
Central Union, Bonds, 5's	3,000,000	1,000	108½	110
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Mutual	3,500,000	100	300	330
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. ..				
Bonds, 5's	11,000,000	1,000	112	113¼
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	..
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	..	..
Northern Union, Bonds, 5's.	1,250,000	1,000	104	106
New York and East River..				
Bonds 1st 5's	2,500,000	1,000	112	114
" 1st Con. 5's	1,500,000	..	108½	108½
Standard	5,000,000	100	125	130
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	180	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	212	220
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	—	—
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	500,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	5,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	5¼
" " Bonds, 5's	5,250,000	1,000	66	68½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	10	108½
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89¼
Preferred	3,096,500	100	107½	109
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	86	..
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	89½	92
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	981,000	1,000	75	75¼
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	104½	105½
" Bonds, 5's	10,500,000	..	107	108
Indianapolis	2,000,000	..	70	75
" Bonds, 6's	2,650,000	..	106½	108
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	..
Preferred	2,500,000	100	95	100
Bonds	10,000,000	1,000	108½	109
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	136	140
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	3,000,000	100	218	218½
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¼
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	107¾	108
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87¼	90
San Francisco, Cal.	15,800,000	100	58½	58¾
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	94	96
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	2,455,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,600,000	20	321¼	322½
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	230	..

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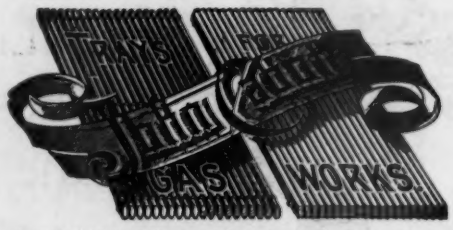

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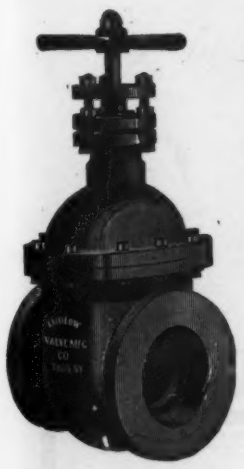

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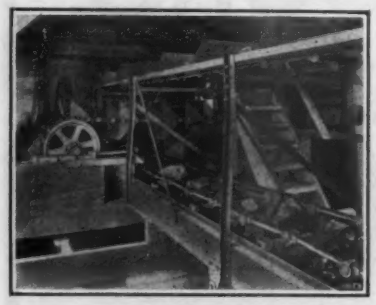

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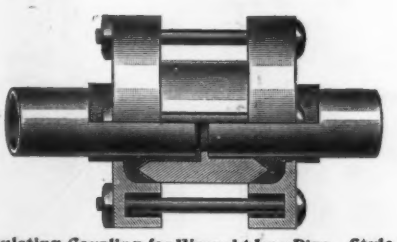
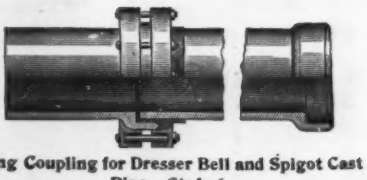
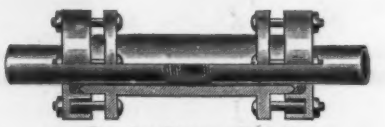


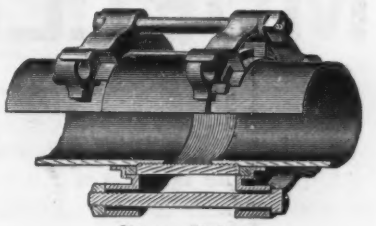
Insulating Coupling for Wrought Iron Pipe. Style 5.



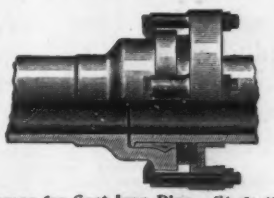
Insulating Coupling for Dresser Bell and Spigot Cast Iron Pipe. Style 6.



Regular Sleeve. Style 2.



Clamp. Style 4.



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Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

My Insulating Coupling prevents the destruction of pipe by electrolytic action, in either water or gas lines.

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To *please* your consumers. What *pleases* them *pleases* you. Steward Burners *please* everybody. Won't you *please* give us the pleasure of *pleasing* your consumers. *Please* do.

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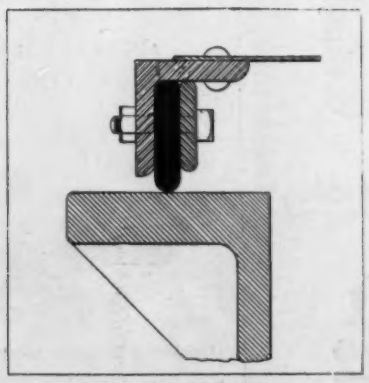
See Last Week.

Lloyd's Rubber Lute



Patented Nov. 8th, 1904.

being held between metal bars all bolted through and supported at the upper edge is brought to a uniform **compression and projection at its contact edge,** and---

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DETROIT, MICH.

MUELLER GAS COCKS.

Good grinding will not keep a gas cock from leaking if the body is not firm enough to hold the ground surfaces in close contact.

Mueller Gas Cocks have sufficient metal about the plug chamber to keep the body firm and unyielding. A close bearing is maintained on the ent re wearing surfaces of both body and plug.

Mueller Gas Cocks are made in straight, oval and round way patterns; the straight being made in the standard, extra and special grades, the oval in the extra grade only, and the round in the standard and extra grades. The cock illustrated is a straight way, special grade, flat head meter cock.

Each cock is carefully inspec'ed and assembled, is given a working test as near like actual service use as possible, bears the Mueller trade mark, and is *unconditionally guaranteed.*

We also make tapping machines and meter connections for gas works' use. Catalogues upon application.

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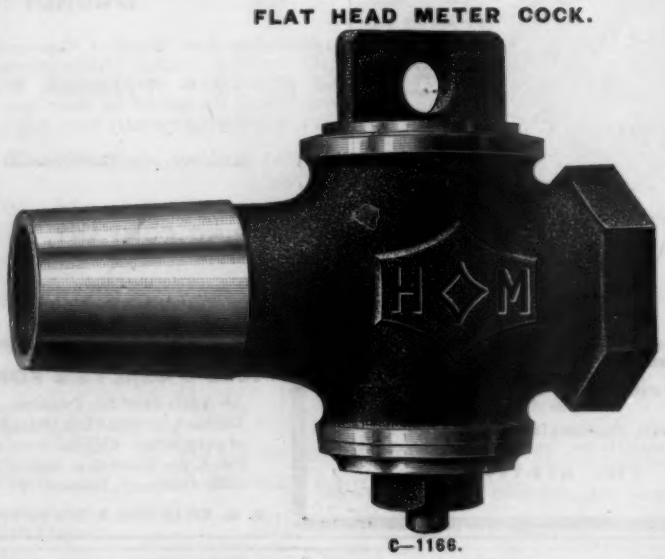

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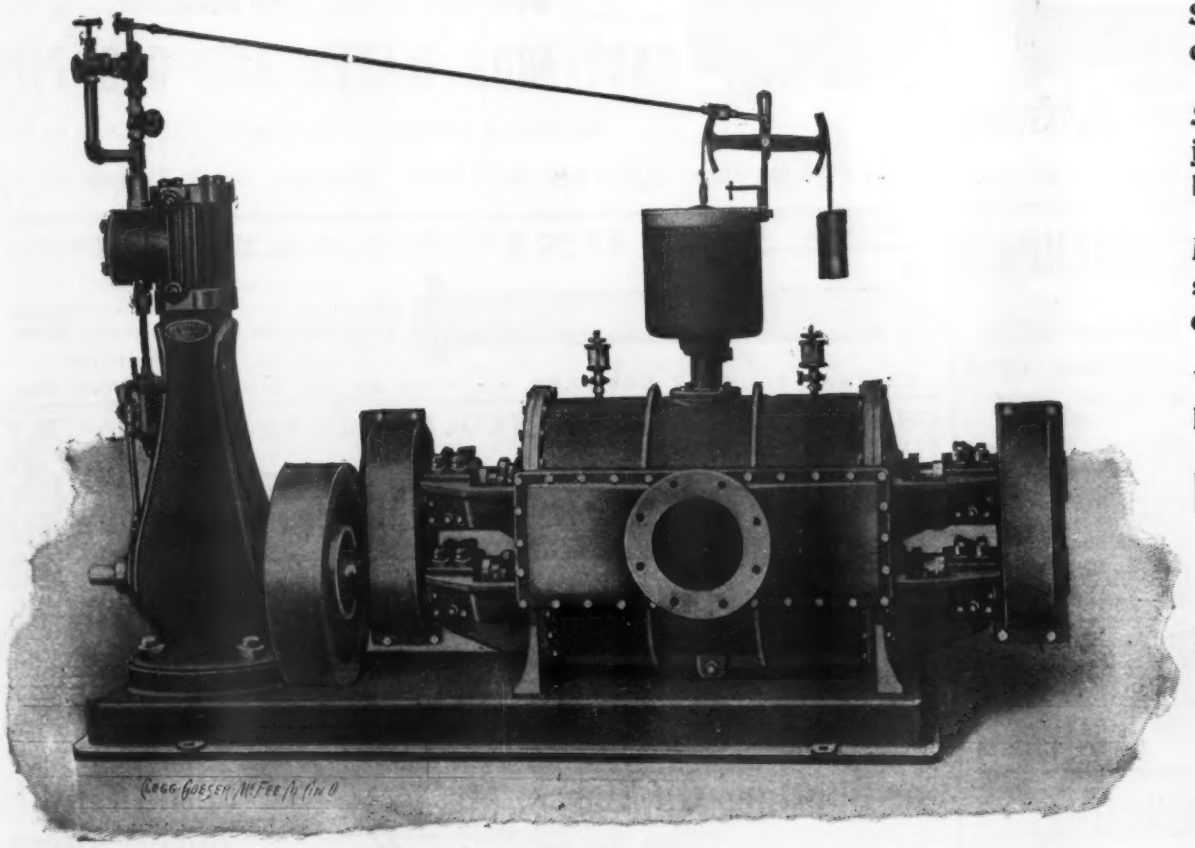
H. MUELLER MFG. CO., DECATUR, ILL., U. S. A.

ROOTS' GAS EXHAUSTERS.



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Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

Write for Catalogue.

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Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

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Machines Sent to any Gas Company for Thirty Days' Trial.

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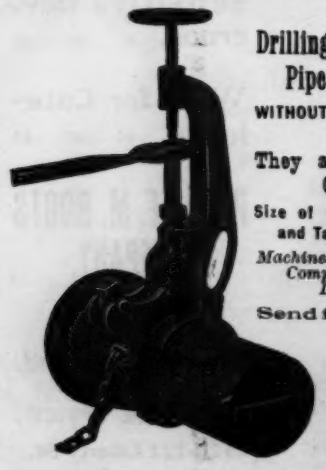

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NO LEAKY JOINTS IN **UNIVERSAL PIPE.**

Specially adaptable for—
High and Low Pressure Gas Mains.
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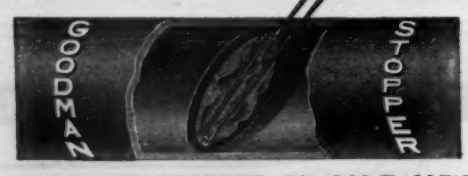
Wholesale Eastern Agents AKRON VITRIFIED SEWER PIPE.

SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains Temporarily during alterations and repairs. : : : :

Any size gas main can be shut off in 30 seconds. : : :



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STATIONARY, SHAKING, DUMPING.

BARS FOR HAZELTON BOILERS.

LINK-BELT

OPEN TOP CARRIER.

ESPECIALLY ADAPTED FOR HANDLING

Coal, Coke, Ashes, Stone, Ores,

Or any heavy or gritty materials, where strength and durability are essential. Constructed in any length or capacity, and to suit local conditions.

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Link-Belt Engineering Co. Philadelphia Chicago, U.S.A.

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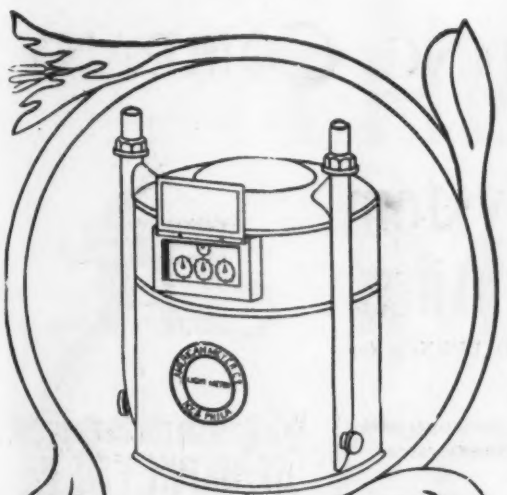
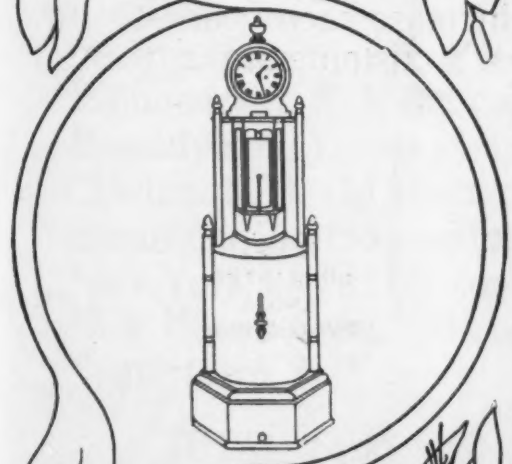
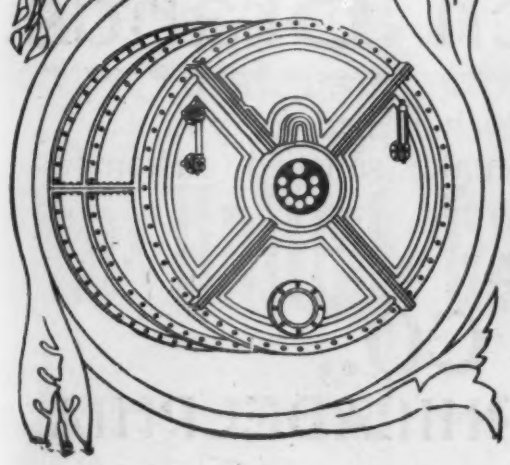


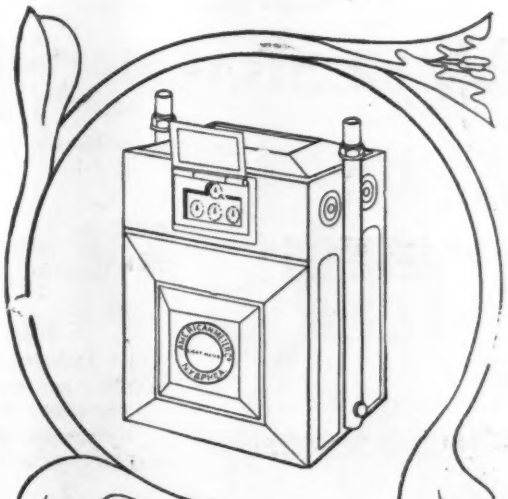


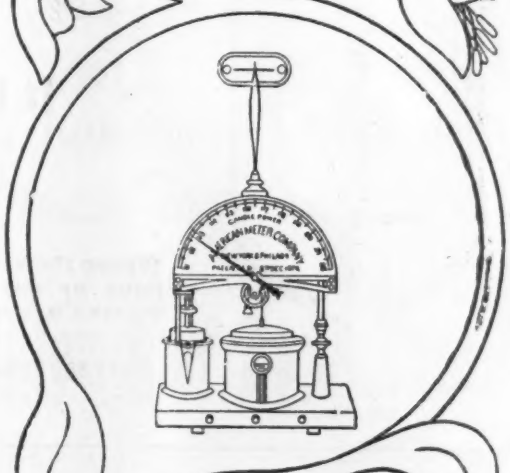


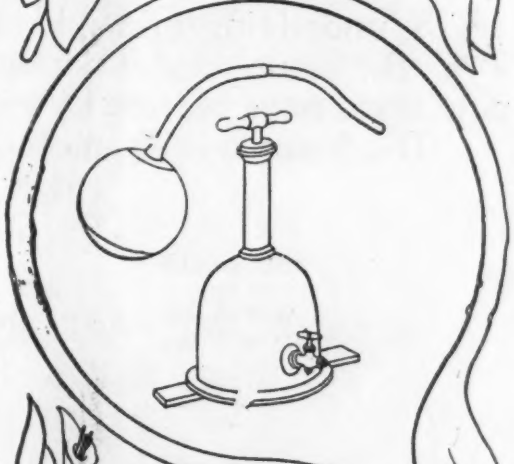
PUBLIC LIGHTING TABLE.

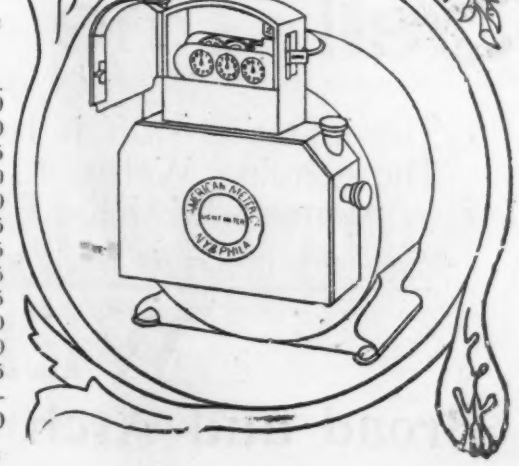
DECEMBER, 1904.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Thu.	1	5.10 PM	2.40 AM	4.20	6.10
Fri.	2	5.10	3.50	4.20	6.10
Sat.	3	5.10	6.00	4.20	6.15
Sun.	4	5.00	6.10	4.20	6.15
Mon.	5	5.00	6.10	4.20	6.15
Tue.	6	5.00 NM	6.10	4.20	6.15
Wed.	7	5.00	6.10	4.20	6.15
Thu.	8	5.00	6.10	4.20	6.15
Fri.	9	5.00	6.10	4.20	6.15
Sat.	10	5.00	6.10	4.20	6.20
Sun.	11	8.10	6.10	4.20	6.20
Mon.	12	9.10	6.10	4.20	6.20
Tue.	13	10.10	6.10	4.20	6.20
Wed.	14	11.00 FQ	6.10	4.20	6.20
Thu.	15	12.00	6.10	4.20	6.20
Fri.	16	12.50 AM	6.10	4.20	6.20
Sat.	17	1.50	6.10	4.20	6.20
Sun	18	2.50	6.20	4.20	6.20
Mon.	19	3.50	6.20	4.20	6.20
Tue.	20	4.50	6.20	4.20	6.20
Wed.	21	No L.	No L.	4.20	6.20
Thu.	22	No L. FM	No L.	4.20	6.20
Fri.	23	No L.	No L.	4.20	6.20
Sat.	24	5.10 PM	8.00 PM	4.20	6.25
Sun.	25	5.10	9.10	4.20	6.25
Mon.	26	5.10	10.20	4.20	6.25
Tue.	27	5.10	11.20	4.20	6.25
Wed.	28	5.10	12.30 AM	4.20	6.25
Thu.	29	5.10 LQ	1.40	4.20	6.25
Fri.	30	5.10	2.50	4.20	6.25
Sat.	31	5.10	4.00	4.20	6.25









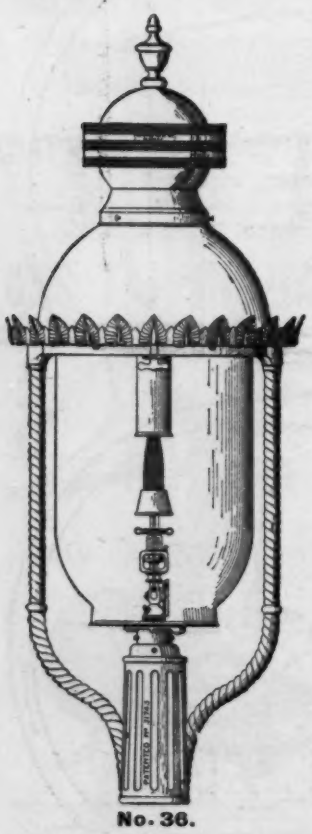
TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280 25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00

NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting.

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

AN underlying principle in business is to show an increase each year---to grow. The astute dealer not only seeks to retain this year's customers, but to attract new trade next year.

The formula is simple---

THIS SHIELD IS THE WELSBACH TRADE MARK.

IT IS A GUARANTEE AND A PROTECTION.

Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

And your profit isn't merely dollars and cents.

WELSBACH CO.,

Broad and Arch Sts., PHILADELPHIA.

THE UNITED GAS IMPROVEMENT COMPANY

For the Period Ending July 31st, 1904, has been Awarded Contracts in the Following Places for

Standard Double-Superheater Lowe Water Gas Apparatus.

Augusta, Me.
Bangor, Pa.
Woonsocket, R. I. (2d contract).
Brooklyn, N. Y. (4th contract).
Cincinnati, O. (2d contract).
Scranton, Pa. (3d contract).
New York City (14th contract).
New Haven Conn. (2d contract).
Watertown, N. Y.
Tampa, Fla. (3d contract).
Westchester, N. Y. (3d contract).
Bridgeport, Conn. (2d contract).
St. Paul, Minn. (2d contract).
Harrisburg, Pa.
Pelham, N. Y.
Reading, Pa.
Springfield, Mass. (2d contract).
Lynn, Mass. (5th contract).

TOTAL SETS, 1904, ... 35
TOTAL DAILY CAPACITY, 1904, . . 50,400,000 cubic feet.
TOTAL SETS TO DATE, ... 543
TOTAL DAILY CAPACITY, . . . 413,180,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

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CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

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FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

OFFICE AND WORKS:
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MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

Established 1854. Incorporated 1869.

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Manufacturers of { GAS RETORTS . .
FIRE BRICK . . .
RETORT SETTINGS

Water Gas Cupola Linings, Fire Clay, Etc.

Proprietors for the U. S., Coze System of Inclined Benches.

Estimates Furnished on Application for Most Successful Style of Construction.

Also for Free-Firing and Full and Half-Depth Regenerative Benches, for Burning either Coal or Coke in the Furnaces.

Office: Cor. Manchester and Sulphur Avenues, **St. Louis, Mo.**

Established 1845. Reorganized 1902.

The Kreischer Brick Mfg. Co.,

Manufacturers of the very best quality of Clay Retorts, Blocks, Tiles, Settings and Firebrick of every description.

Also Miners and Shippers of Fireclay, Fire Sand, Ground Brick in Barrels.

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Adam Weber Sons.

GENERAL OFFICES: Park Row Bldg., N. Y. City.
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Modern Coal Gas Plants,

With either Horizontal, Inclined or Vertical Retorts.

PATENTS APPLIED FOR.

No. 1. Firing horizontal benches with pulverized fuel, with either 8 or 10 retorts in 1 setting, using one furnace for two benches. Great saving in labor, fuel and life of retorts and settings. No elaboration of complex recuperation.

No. 2. Independent retort settings, taking all weight from retorts.

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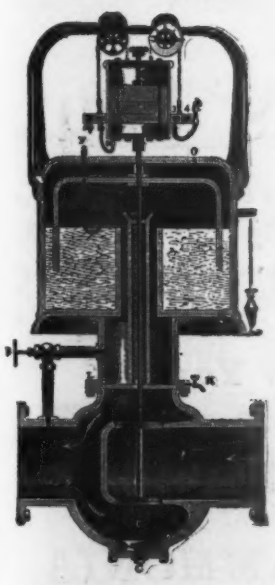

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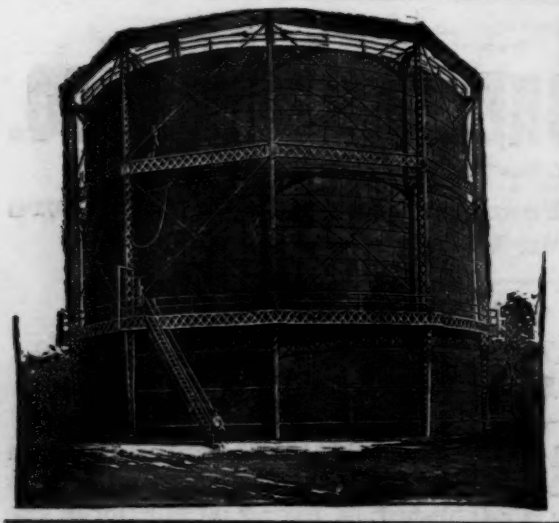

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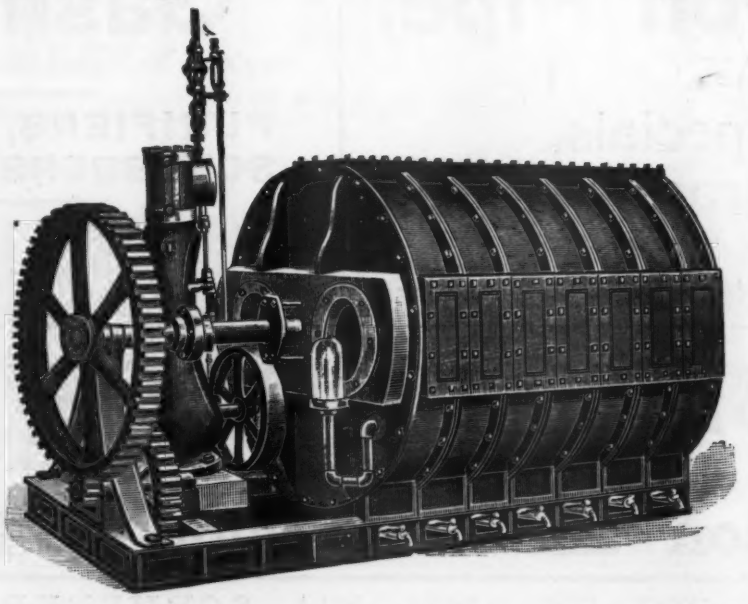

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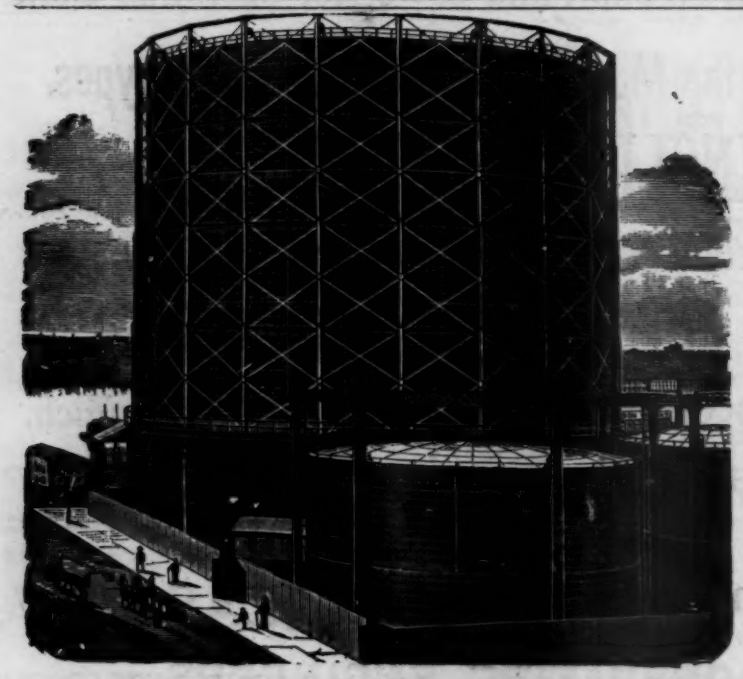

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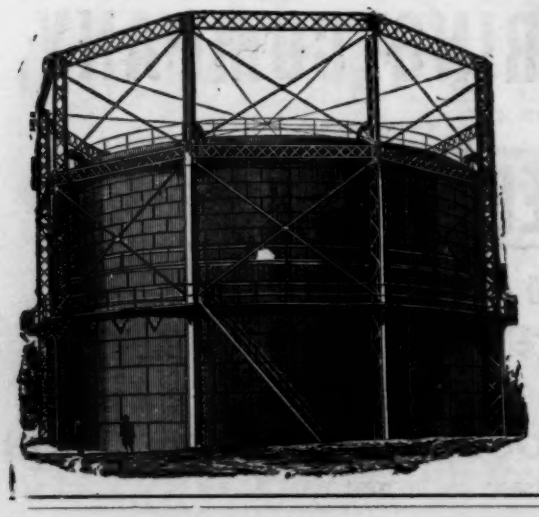

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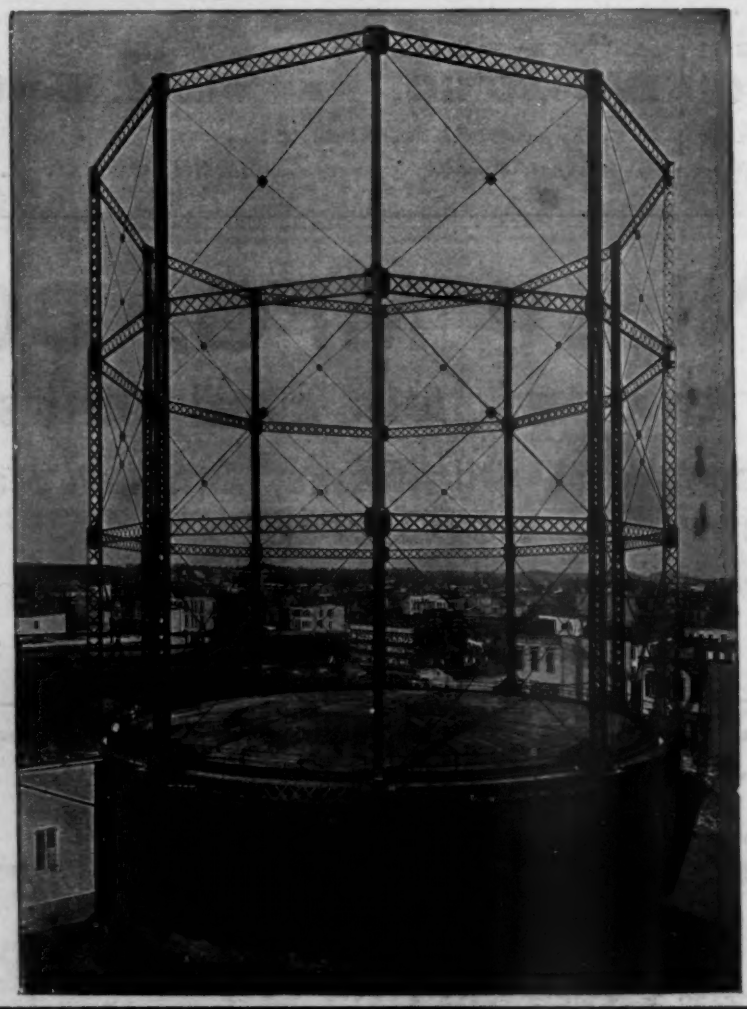

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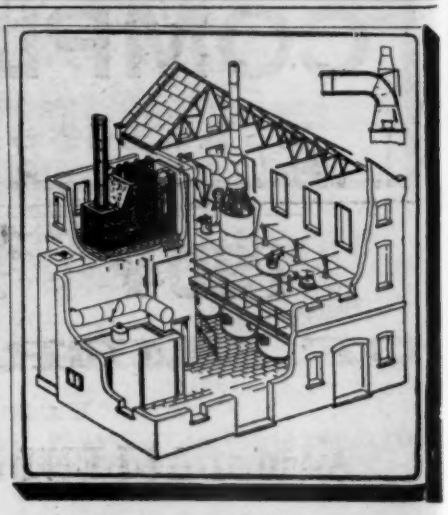

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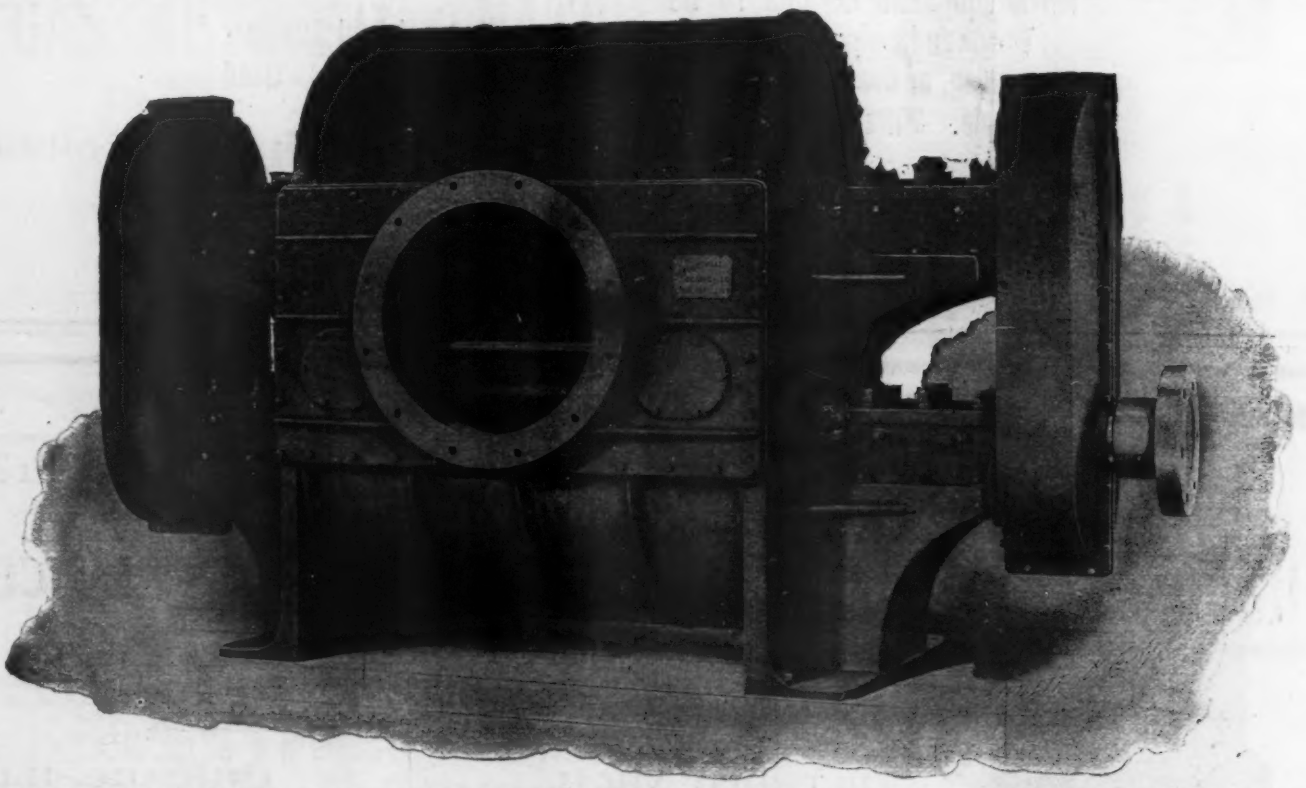

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The Western Gas Construction Company,

General Offices and Works, Fort Wayne, Ind.

NEW YORK OFFICE, 2,015 Park Row Building. **SAN FRANCISCO OFFICE, 137 Montgomery St.**